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RURAL HOUSEHOLD SCIENCE.

Time was when pioneers fared forth into virgin land—beneficently granted by a more or less paternal Government—equipped with stout hearts, a few crude tools, and little else; there they proceeded to carve out a holding that in time became the "homestead" to themselves and a rising generation. It was a life's work, and few who succeeded saw more than the realisation of an ambition to leave behind a cultivation where once was primeval forest. The children and the children's children reaped the benefit. The pioneer passed to his greater reward; but he had made history.

In this struggle for triumph over nature who could deserve greater praise than those lion-hearted women who accompanied the pioneer in all his hardships, tended to his creature comforts, mothered his offspring, and in a life of isolation and sometimes penury exhibited a devotion and camaraderie that stayed him in his determination to succeed?

> They left the vine-wreathed cottage and the mansion on the hill,
> The houses in the busy streets where life is never still,
> The pleasures of the city, and the friends they cherished best:
> For love they faced the wilderness—the Women of the West.

Time and circumstance have demonstrated the wisdom of smoothing the path for the land settler, and in these days much of the pioneering hardship is removed. The Government of this State, at least, sees that he is provided with a livelihood during the initial stages, helps him to clear his land, to stock it, and to reach his harvest. All this is as it should be in a country teeming with potential wealth, starving for population and capital to develop it. But yet the life of the embryo farmer is no bed of roses. If there is less of isolation and endurance there are still all those disadvantages that cannot be dissociated from big distances sparsely provided with transport facilities, always involving a maximum of sacrifice and a minimum of immediate re-

ward. And in this the "Women of the West" are still beside him, sharing his successes and his failures, rejoicing with him in his progress, comforting him in his reverses.

Just as the Government realised the necessity from a national viewpoint of assisting the farm-builder in a practical way, so the organisers of the Rural Science Courses visioned a means of lightening the burden of his helpmate. It was in 1921 the idea was first conceived by the Director of Agriculture (Mr. Geo. L. Sutton), who lost no time in conferring with Professors Paterson and Nichols of the Perth University, both of whom he found willing to help to the utmost extent. The University and the Department of Agriculture collaborated, and the conference crystallised a draft syllabus consisting of about 16 lectures, and in addition provided nine excursions for the womenfolk out back. These lectures were chosen with a perfect discernment of the needs of proposed students: Dietetics, the Healthy Home, Flies, Fleas and Mosquitoes, the Chemistry of Milk and Butter, Pure Water Supply, the Churn and Separator, the Home Orchard, Fruit Preserving, the Treatment of Simple Injuries, the Use of the Clinical Thermometer, and the Kitchen Garden and its Preparation. It was wisely decided to confine the classes to two lectures at two periods of each day, thus avoiding any liability to overburden or weary the students with a surplus of instruction, leaving the afternoon and evening free for excursions and entertainment, and in experience this proved to be an excellent scheme. To emphasise the lectures visits were arranged to such institutions as the King Edward Maternity Hospital and Public Hospital, the School of Cookery, the Claremont Dairy, Jam Factories and Piggeries, a Spinning Demonstration, and other useful media of pointing facts to be explained. So far so good, and a published announcement of the intention brought forth great interest and promised support; there remained the difficulty of assisting those who wished, but could not realise the advantages. The aid of the Commissioner of Railways was next invoked, and a ready and appreciative sympathy at once extended by the offer of concession fares at single rates for the double journey. To say that immediately plans were completed the conception met with unanimous approval is to state the case mildly. Not only from the country districts came immediate applications for enrolment, but city entrants claimed inclusion, and amongst these were Mrs. Mary Farrelly, Mrs. M. A. Driver, and Miss F. K. Wells, well-known workers in the cause of women's uplift, whose *bona fides* in such a cause were a guarantee not only of its necessity but ultimate success. This led to their appointment as a committee to associate with country aspirants, put them at their ease, and initiate them into the routine of a scheme designed for their benefit. In March, 1922, the initial class was held under the authority of the Faculty of the University, and in the Science Lecture Room, when 90 applicants for admission were registered, 70 of whom were accepted. This first gathering was opened under the greatest auspices. His Excellency the Governor Sir Francis and Lady Newdegate, His Grace the Archbishop of Perth, Chancellor of the University; the Minister for Agriculture, and

Students attending the Rural Household Science Course at the Perth University.
Front row, centre, "The Mother." Mrs. Farrelly; next on right, Miss M. A. Wylie, Lecturer on Household Management.

numerous prominent citizens attended and gave the new idea their hearty approval. Indeed support came from all quarters; factories were thrown open for inspection, theatres generously extended entertainment to students, the Westralian Farmers, Limited, provided excursions in the most hospitable way, and from the commencement the imprest of support to a generally accepted practicable help for our country women was accorded.

Unlike innovations that have nothing other than novelty to commend them, this new departure took hold. This year marked the fifth successive course of lectures, and there has been no decline in the enthusiasm, but an increased interest is displayed. Women from all parts of the country were present, listening intently to the instruction imparted and watching demonstrations with eager interest, for the most part armed with pencil and note-book, frequently jotting down a record of some important utterance for future reference. The atmosphere of the class-room is at all times redolent of earnestness and attentiveness. Miss Wells and Mrs. Driver have found it necessary to relinquish their interest for the time being owing to pressure of work in other spheres of their activities, but Mrs. Farrelly remains the "mother" of the class-room, ably assisted by Miss A. Price, of the Department of Agriculture, who has taken up the work of Miss Wells.

Amongst those who devote their time to the instruction of these classes it would be invidious to make distinctions. Professors Paterson, Nichols, Ross; the Director of Agriculture; Doctors Dale, McKenzie, Jull; Messrs. Gardner, Hampshire, Wickens, Richardson; and Miss M. A. Wylie, the Inspectress and Organiser of the Household Management Classes of the Education Department, have all earned the gratitude and praise of students. And above it all stands out the fact that it has been a public service rendered in a public spirit, the time and the subject being gratuitously provided by lecturers and demonstrators. It would require greater time and space than are at our disposal to do justice to their generous help; indeed the scheme would never have reached the practical stage had it not been for the willing help and self-abnegation of those who have put aside their private engagements, their personal pleasures and their recreations in order to minister to their friends from the country.

What has been the result? It can never be estimated. Only the lonely woman out-back knows what she has gained in knowledge, in change, and in relief. Does she appreciate it? It would surprise some to learn how many of them, poor in circumstance but rich in wisdom, have hoarded their egg money, starved their ease and sacrificed their desires in order that they might make this annual pilgrimage in search of knowledge and variety. Letters received by the "mother," and others connected with the movement, testify to the great comfort and benefits acquired, and to the regret and grief of others who from force of circumstance have been obliged to miss a year's course, and write that they are with the class in spirit though absent in the flesh. What manifold advantages these women can now enjoy compared with

our earlier "Women of the West." One time the butter would not come because the churn was pixied; now the country woman knows the reason why. Once the bread did not rise, and nothing could explain it; the student of the Rural Science Course can tell you just the reason. The kitchen garden wilted, and the hens refused to lay; the Science Course students breed hens that will lay, and feed and tend kitchen gardens that are a pleasure as well as a profit. One time the housekeeper put cobwebs on the gaping wound to stop the bleeding—and why not, the old doctor did it, and certainly it stopped the bleeding; the class student is alive to that danger. Flies are appreciated at their real menace, the home is brighter and the work is lighter; there is less of sickness and cures are more easily accomplished. All honour to our maternal ancestors and the brave struggle they put up to serve their "man," often saving life by tender nursing and constant care, but who knows even how many these brave women lost through lack of that knowledge that is now disseminated through the Rural Science Course?

TOP-DRESSING EXPERIMENTS AT THE DENMARK STUD FARM.

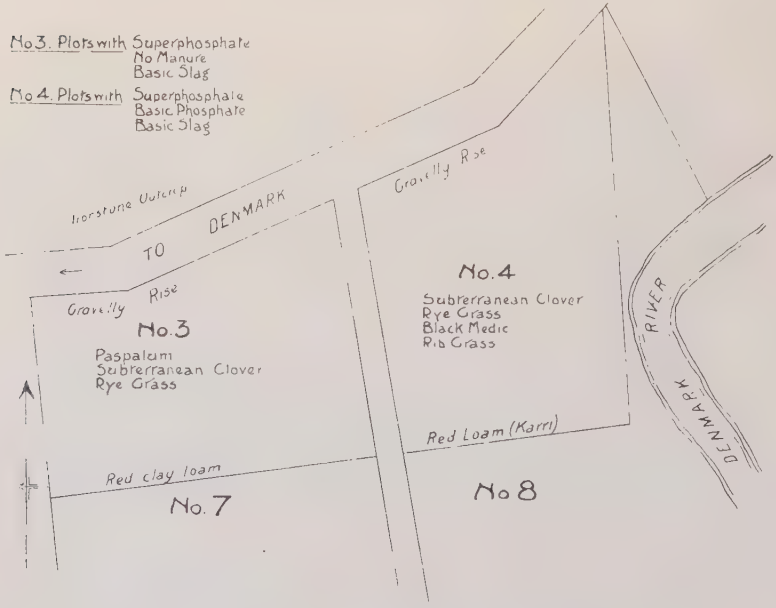
G. K. BARON-HAY, B.Sc.(Ag.),
Dairy Adviser.

During the past three years considerable interest has been aroused amongst farmers by the numerous top-dressing demonstrations that have been carried out in different districts throughout the State, and it is now generally recognised that the top-dressing of pastures with a phosphatic manure is a profitable proposition. In practically all these demonstrations superphosphate (22 per cent. P_2O_5) was the phosphatic manure used.

In the Denmark district, however, where the rainfall is heavy—averaging over 49 inches per annum—many farmers held the opinion that superphosphate was not the most suitable manure for that district, and in support of this belief used other phosphatic manures with varying success.

The following experiments were initiated at the Denmark Stud Farm to demonstrate the most suitable manure for top-dressing pastures in that district.

Site of Experiments on Denmark Stud Farm.



The attached diagram shows the situations of the experiments, the class of herbage on the pasture, and the types of soil. The experiments were carried out in triplicate, in order to eliminate error as far as possible.

The rainfall during the period between the application of the manures and the date of cutting of the herbage was 31.60 inches, distributed as follows; the average rainfall during the period is also given for comparison:—

RAINFALL DURING GROWING PERIOD—DENMARK.

	April.	May.	June.	July.	Aug.	Sept.	Oct.	Total.
1925	351	560	485	606	258	379	521	31·60
Average	341	591	728	778	687	533	450	41·08

Mowing herbage on Top-dressed Plots, Field No. 3.

The season generally has been an exceptionally good one in this district.

Field No. 3—A Comparison between Superphosphate and Basic Slag.

The plots in this experiment were top-dressed, using a drill, on 21st April, applying 250lbs. each of superphosphate and basic slag respectively: A "no-manure" plot was used for comparison.

This paddock had been heavily stocked with cattle the previous season.

Prior to being top-dressed the plots were harrowed, using the harrows upside down so as to break up dung heaps and spread them evenly over the pasture. The paddocks were then closed until 20th October, when the herbage was cut for weighing.

Soil.—A red loam on the South side, running up into an ironstone gravel at the North end. The original timber was jarrah and redgum.

Superphosphate Plot, Field No. 3.

FIELD No. 3—YIELDS OF SEMI-DRY HERBAGE, 1925.

Fertilisers.	Yields per acre.			Average yields per acre.	Percentage yields.
	1.	2.	3.		
	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.	
Superphosphate, 22 per cent. P_2O_5	69 1 10	71 1 6	64 3 8	68 1 27	107
No manure	59 2 16	66 3 4	64 3 8	63 3 0	100
Basic Slag. 17 per cent. P_2O_5	47 0 16	62 2 0	66 3 4	58 3 7	92

Field No. 4—A Comparison of Superphosphate, Basic Slag, and Basic Phosphate.

These plots were top-dressed on 22nd April, 1925, and cut on the same day as those in the previous experiment.

Soil.—Near the river a red loam, originally carrying karri, sloping up to a gravelly soil.

The following fertilisers were applied at the rate of two cwt. per acre, using a drill:—

	per cent.	
Superphosphate	22	P_2O_5
Basic Slag	17	,,
Basic Superphosphate	14	,,

This experiment was also carried out in triplicate, the results being shown in the following table:—

Swathe cut through Top-dressed Plots, Field No. 4.

FIELD No. 4—YIELDS OF SEMI-DRY FODDER, 1925.

Fertilisers.	Yields per acre.			Average yield per acre.	Percentage yields.
	1.	2.	3.		
	c. q. lb.	c. q. lb.	c. q. lb.	c. q. lb.	
Superphosphate ...	78 2 8	88 1 16	96 1 0	87 2 27	100
Basic Slag	53 1 20	70 2 24	83 2 20	69 1 3	79
Basic Superphosphate	60 0 12	78 2 8	*132 0 0	69 1 10	79

* This plot is evidently abnormal, and has been omitted in calculating average results.

The above results of the experiments carried out at the Denmark Stud Farm this year show that superphosphate is, of those used, the most economical phosphatic fertiliser for the purpose of top-dressing pasture in the Denmark district.

It is worthy of notice that these results are confirmatory of those obtained with basic slag and superphosphate in other centres of the South-West, where such demonstrations have been carried out, and which were published in the March issue of the *Journal of Agriculture*, 1925.

These results are here repeated:—

	No Manure.		Superphosphate.		Basic Slag.	
	c. q. lb.	Percentage yields.	c. q. lb.	Percentage yields.	c. q. lb.	Percentage yields.
W. Waters, Balingup, 1923 ...	8 0 9	29	28 0 13	100	20 0 11	72
W. Waters, Balingup, 1924 ...	5 0 4	31	16 0 2	100	10 2 10	67
W. Arnott, Jarnadup, 1923 ...	32 1 17	27	118 3 5	100	100 8 0	91
W. Arnott, Jarnadup, 1924 ...			Destroyed by straying Stock.			
Average ...	...	29	...	100	...	77

EXPERIMENT WITH BASIC SLAG AND SUPERPHOSPHATE.

This experiment was carried out at the request of Mr. W. Redman, on his farm at Denmark, who, with other farmers in the district, had used basic slag and superphosphate for the top-dressing of pastures with varying results.

Soil.—The site had been cleared some years, the soil being a light loam.

Indigenous timber.—Red Gum and Jarrah.

The pasture consisted of Paspalum dilatatum and Native Clovers.

The manures were drilled with a Purser "Midget" drill on 6th April, 1925, using 2cwt. per acre each of—

Superphosphate .. .. 22 per cent. P_2O_5
Basic Slag .. .. .. 17 per cent. P_2O_5

The experiment was carried out in duplicate.

"Feeding-off" the Top-dressed Plots

The herbage was cut on 25th November, 1925, with the following results:—

Weights of Green Material.

	First.			Second.			Average.			Percentage Yields.
	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt	qrs.	lbs.	
Superphosphate ...	55	2	16	37	3	15	46	3	6	212
Basic Slag	43	0	23	37	3	14	35	2	4	164
No Manure	28	3	6	14	1	17	21	2	12	100

This experiment is confirmatory of other experiments carried out recently with these two manures, and indicates that, on such soils, superphosphate is the most economical manure to use for top-dressing pastures.

KIKUYU GRASS.

(*Pennisetum clandestinum*, Chiov.)

C. A. GARDNER.

Kikuyu Grass, a native of Tropical East Africa, is now fairly well known as a pasture grass in various places in Australia. This plant, even in its native country, very rarely produces seeds, or even flowers, and it is propagated by means of its roots and underground stems. Its introduction into Rhodesia and Australia was carried out by means of roots.

Mr. Russell Walton, a resident of Inglewood, a suburb of North Perth, has been experimenting with Kikuyu Grass as a lawn grass. During the early summer months he noticed on the shorter stems in his lawn an eider-down-like fluff, which we found upon examination to be the flowers of this plant, the hairy styles being the downy portion that had attracted attention. The other portions of the flowers remain concealed within the leaf sheath.

This is the first record of the plant having flowered in this State, and perhaps the first record for Australia, also. A notable feature of the plant is that the flowers are only produced on the shorter stems, the more vigorous shoots being without them. So far no seeds have been observed.

A BIN FOR BULK OATS.

Geo. L. Sutton,
Director of Agriculture.

In order to provide economical and safe storage for some of the oat grain which is used for stock purposes at Cranmore Park, Mr. E. H. B. Lefroy has had constructed the galvanised iron container shown in the illustration herewith. The details regarding this are likely to be of especial interest to sheep owners who are increasingly recognising the value of the oat grain for supplementing scanty pastures. This circular silo or container has a capacity of about 3,600 bushels. It is 21 feet in diameter and 14 feet high. In order to prevent removal by the wind when empty it has been placed in an excavation, the bottom of which is the floor of the silo and is 6 inches below the natural surface of the ground. The sides of the tank are constructed of curved corrugated galvanised iron, the bottom ring of which is 20 gauge and the remainder 22 gauge. The two bottom rims are riveted and soldered together, the second rim fitting inside the bottom one. The rims above the second are riveted, but not soldered, and the bottom of the higher one fits outside the top of the lower so as to prevent water from the sides finding its way to the interior; the vertical joints are riveted together with tarred bagging between the sheets so as to prevent water leaking through. The top is made of plain iron with just sufficient pitch to throw off the water.

On the side not shown in the illustration a door is placed to enable portion of the silo to be filled by manual labour, whilst the balance of the oats is placed in the silo by hauling the bags up with a horse and emptying their contents through a door in the top. This year the top portion of the silo was filled by bringing a loaded wagon alongside the bin. This was well loaded to a good height so that the top was within 3 feet of the top door. Another loaded waggon was then brought alongside the first, and the bags unloaded on to the first, and then into the bin. In practice this proved a satisfactory arrangement and quite as good as the former plan of hoisting.

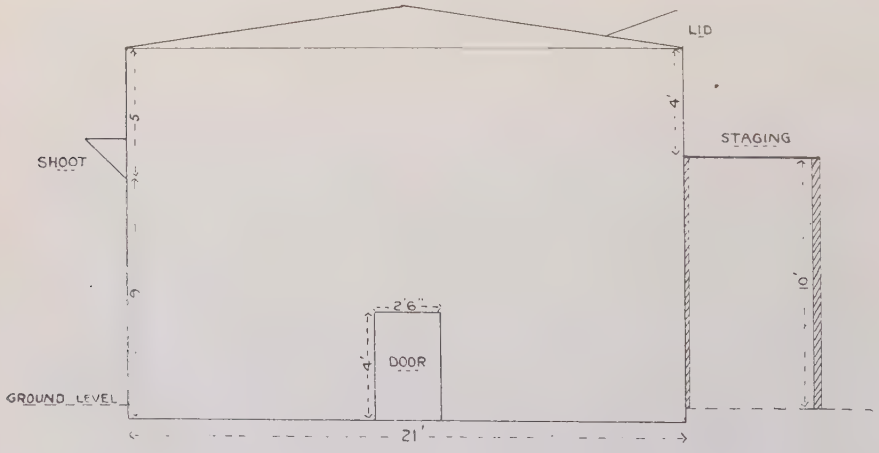


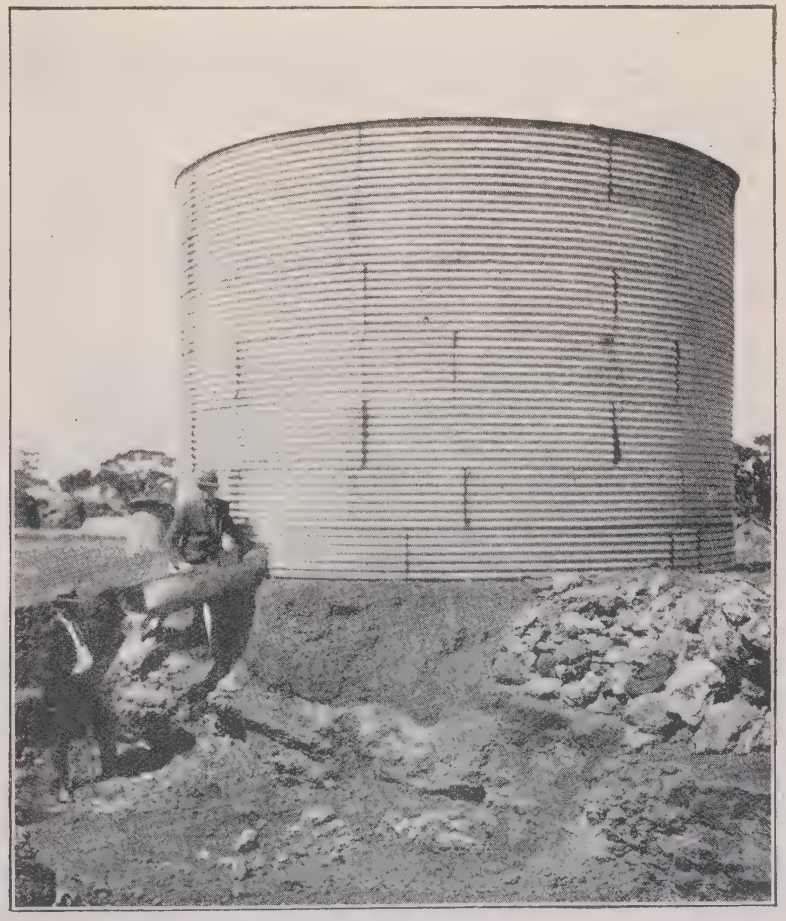
DIAGRAM OF OAT BIN

Because of the success of this latter method it is proposed to build a permanent stage alongside the bin and load from the wagon to the stage and thence through the door into the bin.

On the first occasion the bin was filled to about two-thirds of its capacity, and the doorway, which was of the usual dimensions, proved satisfactory, but this year when the silo was filled completely the doorframe proved defective. It is now proposed to remedy this by having a much stronger and smaller doorway—one about four feet high, and just large enough for entering the bin. Instead of filling the bottom portion through a large door as formerly, it is now intended to construct a shoot about 9 feet from the ground, so that the oats can be tipped into this straight from the wagon. These additional details are shown in the sketch at page 18.

A small quantity of oats against the side of the silo was damaged as the result of "sweating" which took place, and it is proposed to overcome this by providing ventilation at the top and by painting the sides with Taylorite.

As may be seen from the illustration the oat container has been placed on the top of a rise, so that a large portion of the contents can be ex-



A Bin for Bulk Oats.

peditiously and easily emptied by gravitation into vehicles placed below the outlet, and standing on a roadway cut into the side of the elevation on which the container has been erected.

It is estimated the container when erected cost £80, and quite recently a quotation of £85 was obtained for the material, construction and erection of a similar one. Having due regard to the saving in bags, insurance, and loss by mice, the erection of a container at such a price is considered an economical and sound investment, which will provide a safe way of conserving that concentrated foodstuff which can be grown most readily on any sheep farm in Western Australia.

Some farmers adopt the practice of purchasing bran with which to ration their ewes due to lamb when the pastures are dry. For such purposes bran is undoubtedly excellent because of its laxative qualities, and supplying, as it does, a relatively large amount of protein. It, however, has the very serious disadvantage that it is invariably the dearest stock food on the Western Australian market, whilst oats, on the other hand, are usually the cheapest, and particularly so when farm-grown. They do not contain the same percentage of digestible protein as bran, but this deficiency, if necessary, can be overcome by mixing linseed or cocoanut cake with the oats. Two hundred pounds of a mixture of oats and linseed cake in equal parts will be found to supply about the same quantity of protein as 330 lbs. of bran, but much more cheaply.

BLACK SPOT OR BLOSSOM-END ROT OF TOMATOES.

W. M. Carne, F.L.S.

Economic Botanist and Plant Pathologist.

This disease is more or less in evidence every summer. This year, following on the hot dry period in January, its occurrence has been common, causing considerable loss to owners.

The trouble is first seen as a small brown mark at the flower end of the young fruit. This spreads until it forms a large dark depressed spot or spots. Later the spots may become covered with a black velvety fungus growth.

Black Spot is not a fungus disease. It is definitely connected with the water relations of the plants. When a strongly growing tomato plant in fruit suddenly becomes unable to take in sufficient moisture by means of its roots it draws water from the fruits; this results in the collapse of the fruit cells furthest from the stalk. When the moisture supply reverts to normal the collapsed cells may recover in the more matured fruit but in young fruit they usually die, producing the disease known as Black Spot.

Deficiency of water may result from two causes:—In the first case, irregular watering in light rapidly-drying soils leads to alternating conditions of plentiful moisture and drought. In the second case, and this probably applies to most commercial plantings, very hot weather, combined with dry easterly winds, may cause such a rapid loss of moisture from the plants that the roots are unable to keep up the necessary supply. It will be found, in these cases, that wilting occurs to a greater or lesser extent during the day from which the plants largely recover at night.

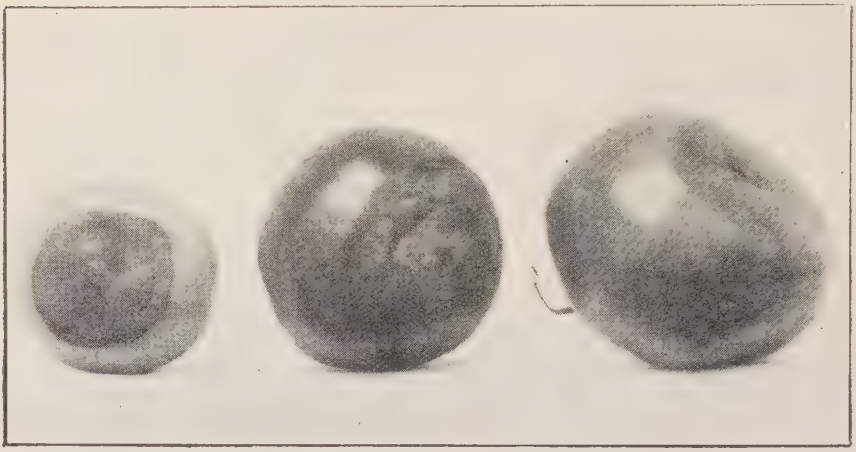
Depending so much as it does on seasonal and soil conditions, little can be done to control Black Spot. Either of two ideals should be aimed at:—

1. To keep the plants continually supplied with ample moisture, avoiding excess which checks root development. In exceptional weather, even with ample soil moisture, the trouble may result from an inability of the roots to supply water fast enough. Light sandy soils should be well mulched with well rotted stable manure or other material. Heavier soils should be mulched or the surface kept well stirred after watering.

2. To avoid forcing plants which come into bearing in January or February. This requires discreet use of water and the avoidance of nitrogenous manures. The use of forcing manures on crops grown on natural soil moisture is particularly dangerous. Plants hardened to relatively dry conditions are less liable to trouble than those making vigorous growth.

In all cases the plants should be sheltered as much as possible from hot winds.

Troubles of similar origin are known on Grapes (Shrivel), and Japanese Plums (Crinkle), in this State, and on Peppers (Blossom-end Rot), and Apples (Drought Spot) elsewhere.



Tomatoes with Black Spot.

LOCUSTS.

L. J. NEWMAN, F.E.S.,
Entomologist.

In view of the widespread nature of this pest during the past season, it behoves all farmers concerned to take all possible precautions against a recurrence of the trouble.

The advent of early rain makes it possible to get to work with the plough and harrows, and thus break up the areas known to contain locust eggs. Farmers were advised to watch and note the patches selected by the locusts for egg deposition. The eggs of this pest are laid in confined areas of land. They hatch and live gregariously or in swarms. If these observations have been made and the egg-laying areas noted, it is advisable to break up same at the earliest opportunity. It is much cheaper to deal with the locust in the egg stage than when moving in armies. The turning of the soil containing the eggs should not be to a greater depth than two inches. If lumpy, harrow well, and thus expose the eggs to the elements, birds, predaceous insects, etc.

Do not rely upon the possibility of the season proving unfavourable to the locust, but be on the safe side and act at once.

BORING FOR POTABLE WATER IN THE WHEAT AREAS.

P. V. O'Brien,

Chief Engineer for Water Supply.

Subterranean water is salt south of about lat. 29 deg., 30 deg., and east of the Darling Range, with the exception of isolated spots where potable or stock water is found.

That portion of the plateau from Mullewa to Ravensthorpe, and from Northam to Southern Cross is gently undulating, and is covered with superficial deposits of varying depth overlying the rock (generally granite).

The average altitude of this plateau is approximately 1,000 feet.

The rainfall, which diminishes going eastward, drains into many shallow basins or valleys known as salt lakes. The majority of these were originally rivers, or tributaries of rivers, but owing to the rising of the country and change of climate they have become as we find them.

Forests of salmon gum, morrell, gimlet, etc., usually follow the shallow valleys where the soil, weathered from the higher land, is deep, with subsoil of clay or loamy clay.

Five hundred wells have been sunk by the Water Supply Department about the wheat areas, and probably as many more by farmers, say, 1,000 in all.

Most of these wells are on the western and North-western parts of the plateau where the rainfall is fair, and the decomposed granites, gravels and grits (in small areas) allow water to percolate below the surface, where it is held above the country rock, or other impervious stratum.

Examination of waters from these wells shows very few, probably not more than 10 per cent., are under 50 grains of salt per gallon; the majority range from 50 grains to 100 grains salt per gallon, and others 100 to 500 grains (stock water).

From this it is clear that potable ground water is extremely scarce in the wheat areas, and practically does not exist in the greater part of the plateau.

It is difficult to advise anyone how to select bore sites without seeing the ground and knowing the locality, but the following may be of help and perhaps save useless work:—

> Assume that a holding or farm is made up of forest country (salmon gum, gimlet or morrell) in the lower lands, and the balance open country such as rolling downs or sand plain.
>
> In looking for bore sites the settler should keep away from the forest country and give his attention to parts where he can find coarse sand, gravels or in vicinity of granite outcrops.

The reason why potable water is not found in forest country is:—

> Timber belts follow the deeper soils which are generally composed of fine loam on the surface and clay loam, or clay below. In localities of moderate rainfall water cannot percolate through these soils, and clay subsoil is practically watertight. What rain falls on the timber belts is used up by the trees, drawn up by the sun. Briefly, rainfall on the timber belts cannot make an underground storage of water.

Cases occur of useful soaks appearing after the forest timber has been cleared. The explanation is that a natural watercourse collects water from the cleared country and sand beds in the watercourse overlying clay or other impervious stratum hold water which previously would have been absorbed by trees.

Most of the wells of potable water are sunk in decomposed granite. Some have gravel wash at or near the depth water is found; in others water is in the saturated decomposed rock, but in most cases the best water is found where the decomposed rock meets the solid granite. It is always advisable to bottom a bore, that is, continue sinking till the country rock, generally granite, is reached. Bores and wells range from 50 to 100 feet and seldom exceed the latter figure in the wheat areas.

DISTRICT CROP COMPETITIONS.

I. Thomas,

Superintendent of Wheat Farms.

For the past three years the Royal Agricultural Society has provided competitions for wheat crops of not less than 50 acres of any one variety amongst the district agricultural societies in each of the three divisions of early, midseason, and late, into which the wheat belt is divided, mainly according to the average annual rainfall of 15 inches, between 15 and 20 inches, and over 20 inches, which is recorded respectively in each.

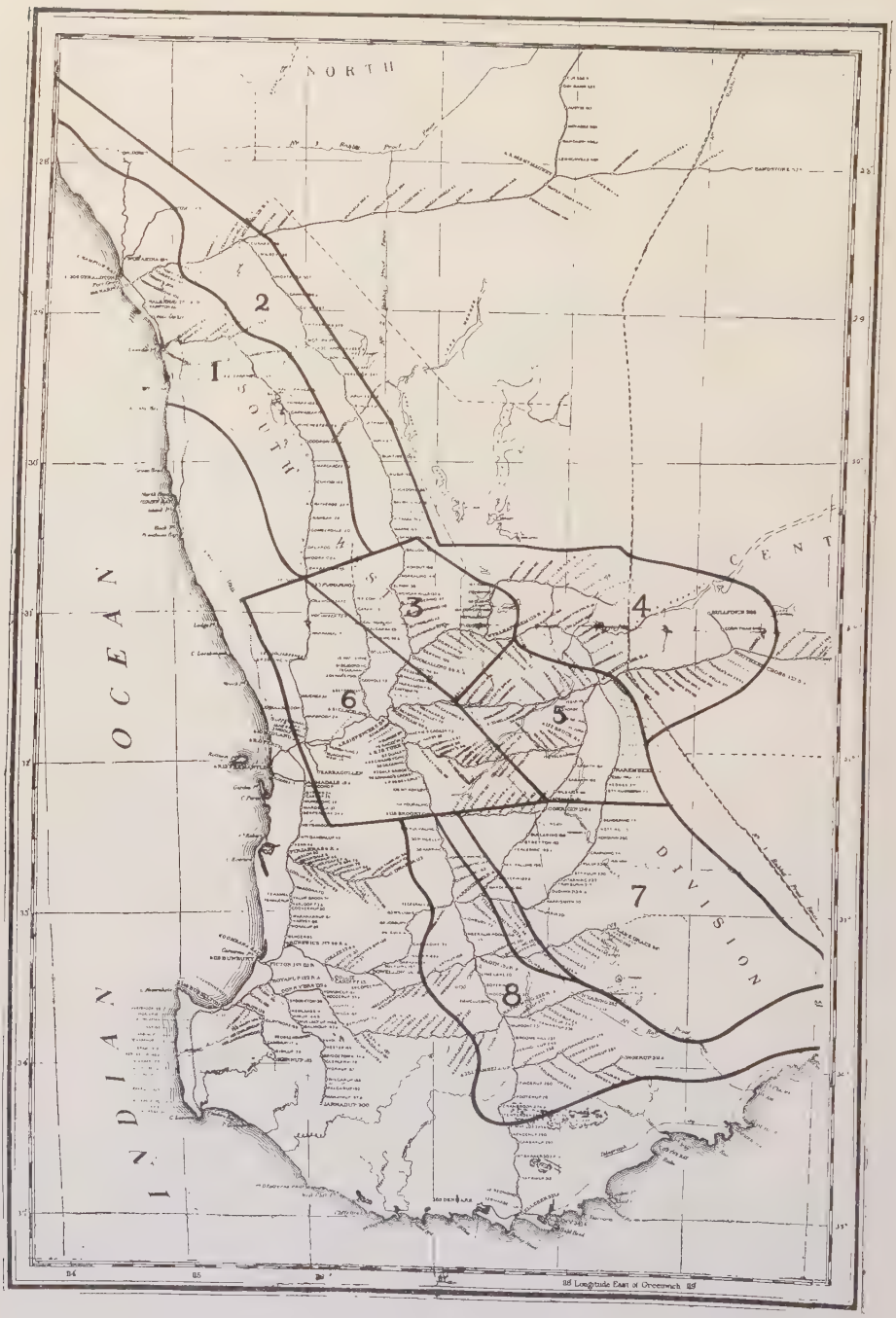
In each of the three zones a championship prize was awarded, also a second prize for the runner-up, those eligible being the first and second prize winners of the district agricultural society's competitions, which are held in accordance with the conditions laid down by the Royal Agricultural Society. These conditions require that the crops shall be of one variety, not less than 50 acres grown on fallowed land, and judged according to a specified scale of points.

It is obviously desirable that all the crops in any one zone should be inspected and the awards for the championship prizes made by the one judge.

The judges of the Royal Competitions since their inception have been departmental officers attached to the Wheat Branch, and the officers have also judged the majority of the district competitions. It was the definite and strong wish of the district societies that the departmental officers should continue to judge the district competitions, but with the wheat belt extending from Ajana in the North to Esperance in the South, it was found impossible for one judge to deal with all the district competitions in one of the three zones. It was therefore decided to re-arrange the zones and to group together the societies which were adjacent to each other, and which had similar interests and climatic conditions. This required that the wheat belt should be divided into eight zones instead of three as formerly.

The eight zones into which the wheat belt is divided for the purpose of these competitions are shown in the accompanying map.

Another change also made this year is to increase the number of points which are allotted for the yield in connection with these crops. The maximum number of points in previous years was 35, but in the past competitions it was found that the highest yielding crops exceeded 35 bushels, and in view of the improvement which is taking place in our methods, and as a corollary in our yields, the yield of 40 bushels seems possible for the best competing crops. As it was decided to give one point for each bushel of calculated yield, the maximum number of points for yield has been increased to 40. In order to retain the aggregate number of 100 points, this latter alteration has required that the points for some other character of the competing crop should be reduced. This was effected by arranging that 20 points should be allotted to "freedom from weeds," instead of 25, as formerly. The prizes



ERRATUM.

Wheat Crop Competitions.

In the map published herewith to show the zone system a double line has been drawn partially between Zone 7 and Zone 8. The most westerly of these two lines appears in error, and should be disregarded, while Zone 8 includes the area between that and the Western boundary line of Zone 7.

are given for the best 50 acres of wheat of any one variety grown on fallowed land, to be judged according to the following scale of points:—

Yield	40 points
Freedom from weeds	20 „
Freedom from disease	15 „
Freedom from admixture	15 „
Evenness of growth	10 „
	100 „

In some of the zones the district agricultural societies make no provision for crop competitions, and in order to prevent farmers who live in such districts from being debarred from competing for the championship prize in their zones, the Royal Agricultural Society permits such farmers to enter for the competitions directly through the Royal Agricultural Society. In this connection Messrs Hebiton & Sons and Messrs. Carter & Sons, both of Three Springs, entered in Zone 1; Mr. J. D. Hammond, of Kellerberrin, in Zone 5; Mr. J. McLean, of County Peak, in Zone 6; and Mr. M. Clifford, of Gilliminning, in Zone 8.

The reports and awards made by the respective judges in the different zones are attached herewith.

The yields are not estimated, but are calculated from the yield of the crop on a number of small areas taken systematically throughout each competition crop, the grain of which is threshed out and weighed.

ZONE 1.

(Judge: I. THOMAS, Superintendent of Wheat Farms.)

The only entries in this zone were those of Messrs. Carter & Sons and Messrs. Hebiton & Sons, both of Three Springs, who entered direct with the Royal Agricultural Society, there being no district competition conducted by the agricultural societies in this zone.

The points awarded are as hereunder:—

Competitor.	Address	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Hebiton & Sons	Three Springs	Nabawa	34	14	14	13	8	83
Carter & Sons	Three Springs	Gresley	21	16	12	12	7	68

The prize winning crop of Messrs. Hebiton and Sons was a well-grown one of "Nabawa," standing four feet six inches in height with no excess of foliage, but with well-filled heads. The appearance of the crop was marred by the presence of wild oats, which showed up very conspicuously throughout. There were also a few patches of "Double Gees," with a sprinkling of "Mustard" and "Cape Weed." It was fairly free from admixture and dis-

ease, but a very slight trace of rust was noticed in the foliage. The evenness of growth was slightly affected by the variation of the soil in one corner, which was somewhat gravelly, the major portion of the competition area was a deep chocolate loam. It was apparent that the preparation given the land had been uniform and thoroughly carried out, and no doubt this was responsible for the high yield, which was calculated to be 34 bushels.

Prize-winning Crop, No. 1 Zone. Grown by Hebiton & Sons, Three Springs; also awarded special prize for highest yield in all Zones. Yield 34 bushels.

The crop of "Gresley" entered by Messrs. Carter and Sons was somewhat handicapped by the nature of the land, portion of which was heavy forest, and the balance of a light nature. Owing to this light land being water-logged during and after ploughing it could not be cultivated as desired, and the result was that the crop was rather uneven in height and did not stool regularly. Although the crop on the heavier land did not have the same attractive appearance as that of the prize winning crop, it was better than that on the lighter soil, which had a number of grassy patches. "Cape Weed" and a little "Drake" were noticed, and a fair number of stranger plants were found in the crop. A trace of rust on the stem and foliage with a sprinkling of loose smut was also noticed.

The details of cultivation of both crops are as shown in the table attached:—

The rainfall, as officially recorded at Three Springs, is as follows:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	387	9	132	2	174	450	206	44	208	35	1,117	17	76	1,840

Competitor	Hebiton & Sons.	Carter & Sons.
Years cropped	At least eight	Three
Timber	Morrel and Salmon Gum	Heavy forest to sandplain
Ploughed	July and August	July and August
Make of Plough	Mould-board	Disc and Mould-board
Depth	4 inches	3 to 5 inches
Condition of land at time of ploughing	Good	Wet side
Other cultivations	Harrowed and T-bar rolled three weeks after ploughing. Cultivated with Sundercut in September and with Springtyne in January, with Sundercut prior to seeding	Portion cultivated with Disc in spring and all prior to seeding
Variety	Nabawa	Gresley
Planted	20th to 25th April	Second week in May
Rate of Seed	56	65
Graded	Yes	Yes
Treated	Copper Carbonate	Bluestone
Rate of Super.	112	60 to 70
Disease	Very slight rust	Trace of rust and loose smut

ZONE 2.

DALWALLINU AGRICULTURAL SOCIETY.

(Judge: I. Thomas, Superintendent of Wheat Farms.)

Of the nine entries received by the society it was gratifying to find that eight remained in the competition, despite the severe seasonal conditions which had been experienced. This district prides itself as being one of the leading wheat-growing centres in the State. It has much good land, and by the adoption of careful and up-to-date methods it should achieve the desired reputation.

After inspecting the competition crops I was disappointed to find that five of the eight crops inspected were infected with ball smut. In a district which desires a high reputation this is rather surprising, and what was even more surprising was the fact that only three of the competitors took steps to prevent this controllable disease. Two successfully adopted the dry method, and the other used the wet method (bluestone and lime), but was not entirely successful as traces of the disease were noticed. This was probably due to some defect in the method of application, as the efficiency of the treatment has been proved over and over again.

The crop of one competitor was free from bunt, although he did not treat his seed. This freedom was due either to the planting of clean seed,

or to the conditions of soil and climate being unfavourable to the spread of the disease. Such a lucky result should not lead others to follow his example, for the risk is too great as is shown by the unsatisfactory experience of the four competitors who did not adopt any preventive means. Not only does ball smut reduce the yield, but it also lowers the value of the good wheat with which it is mixed. The dry treatment with carbonate of copper is the latest and most up-to-date, and is a very effective method of dealing with this disease. The powder is applied at the rate of 2ozs. to the bushel of grain, but the seed must be thoroughly dusted with it. One of the advantages of this method is that the seed can be treated without risk at any time, and when most convenient after harvest, thereby preventing delay at seeding time.

The points awarded to the various competitors are in detail hereunder:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Bradford Bros.	Damboring	Nabawa	26	17	13	13	9	78
Court, A. H. ...	Courtlea, Dalwallinu	Nabawa	23	17	14	14	8	76
Locke, J. ...	Pithara ...	Merredin	22	18	12	13	8	73
Flynn, Morris...	Dalwallinu	Gluyas Late	24	15	12	11	8	70
Flynn, Martin...	Dalwallinu	Gluyas Late	16	18	12	11	8	65
Leaver, W. A.	Dalwallinu	Gluyas Early	16	18	12	11	7	64
Locke, T. C. ...	Dalwallinu	Nabawa	16	16	13	12	7	64
Dowie, J. E. ...	Dalwallinu	Sailor's Fortune	21	16	5	11	7	60

The winning crop of Messrs. Bradford Brothers was of the variety "Nabawa," and was calculated to yield 26 bushels per acre. It was of a

Winning Crop, No. 2 Zone. Grown by Bradford Bros., Dalwallinu. Yield 26 Bushels.

nice stripping height, and even in stooling throughout. It was fairly free from weeds, but contained a little admixture. It, however, had a trace of loose smut.

These competitors were the winners of the district competition last year, and although the calculated yield this year was below that of the previous year, the standard of last year was maintained in other respects.

The crop gaining second place was also of "Nabawa," and was calculated to yield 23 bushels per acre. It was somewhat uneven in height and stooling to that of the winner, but was freer from disease. Both crops were slightly tip withered as the result of the dry spell in August. Sheep were pastured on the fallowed land of both competitors to assist in destroying weed growth.

Details of the various methods of cultivation adopted by the competitors for comparison purposes are shown in the table herewith.

The official rainfall, as recorded at Dalwallinu, was:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	246	98	34	15	173	294	187	31	143	34	792	19	58	1,332

Competitor ...	Bradford Bros.	A. H. Court.	J. Locke.	Morris Flynn.
Years cropped	At least six	At least seven	Fourth crop	Four years
Timber ...	Mallee and Salmon Gum	Gimlet and Salmon	Gimlet and Salmon	Gimler, York Gum and Ti-tree
Ploughed ...	July	August	July	July
Make of Plough	Heavy disc	Mould Board	Sundercut	Mould Board
Depth ...	4 inches	4 inches	3½ inches	4 inches
Condition of land at time of ploughing	Good	Good	Good	Good
Other Cultivations	Cultivated with Springtyne during Spring, again during summer after rain, and also prior to seeding	Cultivated with Springtyne in October and again after rain during summer. Harrowed at seeding time	Cultivated with Disc in October. Cultivated with Springtyne in February and twice before planting	Cultivated with Sundercut in September and also prior to seeding
Variety ...	Nabawa	Nabawa	Merredin	Gluyas Late
Planted ...	Last week in April	Second week in May	Fourth week in May	Late April
Rate of Seed...	68	41	60	60
Graded ...	Yes	Yes	Yes	No
Treated ...	Copper Carbonate	Copper Carbonate	No	No
Rate of Super.	90	60	70	90
Disease ...	Flying smut	Nil	Bunt	Bunt and trace of rust

Competitor ...	Martin Flynn.	W. A. Leaver.	T. C. Locke.	J. E. Dowie.
Years cropped	Second crop	At least eight	Three or four	Ten
Timber ...	Gimlet and Salmon	Gimlet and Salmon	Gimlet and Salmon	Gimlet and Salmon
Ploughed ...	March	August	June and July	July and August
Make of Plough	Mould Board	Mould Board	Mould Board	Mould Board
Depth ...	3 inches	4 inches	3 to 4 inches	4 inches
Condition of land at time of ploughing	Fairly good after rain	Good	Good	Good
Other Cultivations	...	Cultivated with Tandem disc in October and with Springtyne in early November, again in May with Sundercut, and planted with Combine	Cultivated in September, portion in October, and prior to planting	Cultivated with Sundercut in October, and with Springtyne after rain in February, and again prior to seeding
Variety ...	Gluyas Late	Gluyas Early	Nabawa	Sailor's Fortune
Planted ...	Third week in April	Second week in May	Middle of April	Late in April
Rate of Seed...	50	60	56	45
Graded ...	Yes	No	Yes	No
Treated ...	No	Bluestone and Lime	No	No
Rate of Super.	90	70	60	70
Disease ...	Smut	Smut	Flying smut	Smut (bad)

ZONE 3.

Judge: J. H. LANGFIELD,

Manager Merredin Experiment Farm.

WONGAN HILLS AGRICULTURAL SOCIETY.

In this competition there were only four entries, but they compared favourably with those in other competitions in this zone. All the competing crops were "Nabawa," again testifying to the popularity of this variety in this district.

The prize-winning crop was that of Mr. R. B. Ackland, which was a beautifully clean crop with practically no admixture, but unfortunately there were a few patches of double-gees. Two small areas of shade timber slightly encroached on the area.

The land was fallowed in June and worked in August, September, and November, and again in March; it was sown the end of May with 55lbs. seed and 120lbs. superphosphate per acre. The rainfall during the growing period, viz., from 1st May until 31st October, was 1,198 points.

The second crop was that of Mr. R. Sommers, which was sown the middle of May with 60lbs. of seed and 85lbs. superphosphate per acre. This was a very fine crop and very even, but it contained some admixture of "Gluyas Early" and "Gresley." This also had a shade patch which encroached on the plot.

Mr. Spencer's crop was sown early in April with 79lbs. seed and 89lbs. superphosphate. The growth was very rank in some places and carried a

great deal of straw, so that the ears suffered somewhat in consequence. It was very free from admixture and disease, but was knocked about rather badly in places by kangaroos, while a gully ran through one part.

Mr. Parker's crop was planted early in June with 77lbs. seed and 90lbs. superphosphate. It was thin in places, containing a fair percentage of cockspur at one end, and there was also some slight admixture.

The points awarded are as follows:—

Competitor.	Yield.	Freedom from admixture.	Freedom from Weeds.	Evenness of Growth.	Freedom from disease.	Total.
R. B. Ackland ...	31	14	16	8	14	83
R. Sommers	30	12	18	7	14	81
Spencer & Sons ...	28	13	18	7	14	80
C. Parker	23	13	15	7	14	72

DOWERIN AGRICULTURAL SOCIETY.

The following are the results and report of the crop competition of the Dowerin Agricultural Society.

Altogether eight crops were inspected and nearly all were excellent, indicating that the competitors in this competition have adopted good farming methods. If the competition crops are a guide to the general average of the crops in the district a very high yield is assured. Of the crops inspected five were "Nabawa," two "Gluyas Early," and one "Federation."

The prize-winning crop was "Nabawa," belonging to Messrs. Hughes Bros., of Minnivale. It was sown the last week in May with 45lbs. of seed

Minnivale.
Prize-winning crop, Nabawa, No. 3 Zone, grown by Messrs. Hughes Bros.,

and 110lbs. of superphosphate per acre; was thick, very even, and well filled, very free from admixture, and showed that care had been exercised in handling the seed and keeping it pure. It was also very free from weeds, the only thing in any way detracting from its appearance being a few wild oats in one place. It was on fallow that had been well worked, and was harrowed after being drilled.

The second crop was Mr. J. Lindsay's, of Wyalcatchem. The variety was "Gluyas Early," which was sown the third week in May; seed 55lbs. and superphosphate 120lbs. per acre. This was a very clean, even crop, with practically no weeds; contained an odd plant of flag smut but not sufficient to affect the yield. It also contained an odd plant of barley and a few wild oats. The land was fallowed in June and July, cultivated in September and October, harrowed after rain in January, and again in March, and sown with a springtyne drill.

Mr. Lehman's crop was "Gluyas Early," and was a very fine crop, but rather badly knocked about by rabbits. It was very free from weeds of any kind, and the only admixture was a few plants of clubhead; it also contained an odd ball of smut, although it had been treated with copper carbonate. It was sown the first week in May with 58lbs. of seed and 70lbs. of superphosphate.

Mr. Bear's crop was "Nabawa," which was sown the second week in May with 50lbs. seed and 75lbs. superphosphate. The Northern end of the crop was very good, but it fell away a bit towards the Southern end. It was very free from admixture, but contained a few small patches of take-all.

Mr. Allan Jones' crop was "Nabawa," and contained a fair percentage of wild oats and canary grass, also a few plants of barley. It was thick and well filled, and should yield well, though it contained a fair percentage of ball smut (the seed had not been pickled). It was sown at the rate of 65lbs. of seed and 110lbs. of superphosphate per acre.

Mr. Anderson's crop was "Federation"; it was very free from weed growth, but contained a fair quantity of wild oats, also a few small patches of take-all, and a few plants of flag smut; it was sown early in May with 60lbs. seed and 90lbs. superphosphate per acre.

Mr. Stan Jones' crop was "Nabawa"; it had a number of sandy patches, and a gully ran across one corner making it very uneven; it was fairly free from weeds, containing a small percentage of wild oats and barley, also a few small patches of take-all.

The points awarded the various crops are as follows:—

Competitor.	Yield.	Freedom from admixture.	Freedom from weeds.	Evenness of growth.	Freedom from disease.	Total.
Hughes Bros. ...	32	14	18	9	14	87
J. Lindsay	29	14	18	9	14	84
C. H. Lehman ...	28	14	19	7	12	80
E. Bear	25	14	17	8	13	77
Allan Jones	29	12	16	8	11	76
J. S. Anderson ...	27	11	16	8	12	74
Stan. Jones	24	13	17	6	13	73

The rainfall at Mr. Lindsay's, Wyalcatchem, and Mr. Lehman's, of Dukin, was as follows:—

Mr. Lindsay's.			Mr. Lehman's.		
January	214		January	212	
February	104	422	February	98	
March	93		March	64	374
April	11		April	*Nil*	
May	159		May	125	
June	190		June	194	
July	187	727	July	122	
August	23		August	6	588
September	125		September	105	
October	43		October	36	

NUNGARIN AGRICULTURAL SOCIETY.

(Judge: I. Thomas, Superintendent of Wheat Farms.)

Three entries were received for this competition, *i.e.*, Messrs. Creagh Brothers and F. Williams, of Nungarin, and Mr. G. Dunkley, of Yelbeni. The awards made are set out in the table hereunder:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Creagh Bros.	Nungarin	Nabawa	19	18	14	14	8	73
Williams, F.	Nungarin	Gluyas	19	18	12	14	9	72
Dunkley, G.	Yelbeni	Early Onas	22	16	12	13	8	71

The prize winning crop of Messrs. Creagh Brothers was a very clean one of "Nabawa," and was calculated to yield 19 bushels per acre. There were very few weeds and admixture. It was free from disease, but somewhat irregular in height, and was tip withered in a number of patches.

The second prize winning crop of Mr. F. Williams was of "Gluyas Early," and although short in straw was even in growth, with a few weeds, and almost free from admixture. The yield was calculated at 19 bushels per acre. A slight trace of ball and flag smut was noticed.

The crop of Mr. G. Dunkley was one of "Onas," the greater portion of which appeared to have made strong growth until it was checked by lack of moisture. It was very dense, and for the most part even in height, but the heads were tip withered. One fairly large patch was very bad with wild oats, which had affected the growth of the crop. Flag smut was also present.

The disease of flag smut is much more difficult to control than ball smut, owing to the disease being transmitted through soil infection and distributed through the spores in the foliage of the wheat plant and also as the result of being blown about. To control this disease it is advisable that the stubble should be burnt, and the ground fallowed during the winter: all weed growth should be destroyed either by sheep or cultivation during the fallowing period. Further, it is advisable, if possible, to grow a crop of

oats the following season, but should this not be possible a variety such as "Nabawa," which has proved resistant to this disease, should be planted.

All the competitors treated their seed for ball smut, using the dry method. In one crop a trace of smut was found, but this was probably due not to the ineffectiveness of the copper powder, but to the incomplete dusting of the grain with the powder, which is the most important factor in the method.

The methods of cultivation adopted by the competitors are set out in the table herewith. It will be noticed that the methods are very similar.

The rainfall, as officially recorded at Nungarin, was:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Tota.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	288	140	137	35	122	229	187	19	98	64	719	24	114	1,457

Competitor ...	Creagh Bros.	F. Williams.	G. Dunkley.
Years cropped	Twelve	Six	Six
Timber ...	Salmon, Gimlet and Mallee	Gimlet and Salmon	Gimlet, Salmon and Mallee
Ploughed ...	July	June	July and August
Make of Plough	Disc	Mould Board	Mould Board
Depth ...	4½ inches	4 inches	4 inches
Condition of land at time of ploughing	Good	Good	Good
Other Cultivations	Skimmed ploughed in October; cultivated with Springtyne in February. Planted with Combine	Cultivated with Springtyne in August, harrowed a month later and again in January. Cultivated in March and planted with Combine	Cultivated with Springtyne early in September and November, again in January and prior to seeding. Sheep grazed on fallow
Variety ...	Nabawa	Gluyas Early	Onas
Planted ...	Fourth week in April	Middle of May	Last week in May
Rate of Seed...	45	55	60
Graded ...	Recleaned	Yes	Yes
Treated ...	Copper Carbonate	Copper Carbonate	Yes
Rate of Super.	70	75	120
Disease ...	... ...	Slight Bunt and Flag smut	Flag smut rather bad

ZONE 4.

MOUNT MARSHALL DISTRICT AGRICULTURAL SOCIETY.

The entrants in this competition numbered seven, and were as follow:—Messrs. R. & J. Walters, W. Smallwood, F. C. Weyman, H. Fletcheroft, B. W. Hopwood and Purdom.

The last-named withdrew before an inspection was made. The crops of the different competitors were inspected in the order in which the names are given above.

The details of the awards made are as hereunder:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Hopwood, B. W.	Bencubbin	Merredin	22	18	13	14	8	75
Weyman, F. C.	do. ...	Nabawa	19	16	14	13	7	69
Fletchcroft, H.	Gabbin ...	Gluyas	18	18	14	10	7	67
Smallwood, W.	Bencubbin	Early do.	13	18	12	13	7	63
Walters, R. & J.	do.	Nabawa	14	16	14	12	7	63

Mr. Hopwood's winning crop of "Merredin," calculated to yield 22 bushels per acre, was part of 200 acres of the same variety which was very similar in appearance to the competing portion. It was very even in height, but varied a little in the character of its stooling, and some of the heads were not fully developed. It was free from weeds and admixture, but a trace of ball smut was noticed.

The second prize winning crop was that of Mr. F. C. Weyman, whose farm adjoins that of Mr. Hopwood. The variety was "Nabawa," and was calculated to yield 19 bushels per acre. There was considerably more weed growth, and the variation in height and stooling was more pronounced than in the winning crop. No disease was noticed.

Two of the five competitors treated their seed to prevent smut, one with Bluestone and the other with Carbonate of Copper, and in these two crops no smut was noticed. Ball smut was found in two of the remaining crops, including that of the winner. I wish to emphasise the risk which is being taken by not treating the seed for smut. The method of prevention is so simple and so efficient, and as the dry method of treatment is so convenient, the risk, following upon the neglect to treat the seed, is not worth while, and if the practice of neglecting to treat the seed is continued the loss due to non-treatment may be difficult to ascertain. The banking account of these neglectful farmers will, however, remind them of the old adage: "Penny wise and pound foolish."

The details of the different methods of cultivation by the various competitors are given for comparison in the table herewith.

It is interesting to note that the fallowed land of both the first and second prize winning crops received several cultivations after ploughing, some of which were made after rain in the summer. No doubt such cultivations, because they conserved moisture, were of benefit to the crops which were afterwards grown; how much so it is difficult to say, but as the different competitors' methods are stated the only conclusion that can be drawn is that better returns are obtained when the seed is sown on well-worked fallow, which in the case of the two prize-winning crops, were in addition, when necessary, pastured by sheep to assist in the control of weeds.

The rainfall officially recorded at Bencubbin and Koorda was:—.

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
Bencubbin	470	90	166	32	109	188	177	14	92	40	620	12	129	1,519
Koorda ...	250	124	39	4	107	182	171	11	105	15	591	8	119	1,135

Competitor ...	B. W. Hopwood.	F. C. Weyman.	H. Fletchcroft.	W. Smallwood.	R. & R. J. Walters.
Years cropped	Fourth	Tenth	Fourth	New land	Second
Timber ...	Mallee, little Gimlet and Ti-tree, scrub	Gimlet, Salmon and scrub	Salmon, Gimlet and Ti-tree	Salmon Gimlet and Mallee	Gimlet and Mallee
Ploughed ...	July	June	August	During June to August	July
Make of Plough	Sundercut	Disc	Sundercut	Twice cultivated with Springtyne	Disc
Depth	4 inches	3 to 4 inches	3½ inches	3 inches	3 inches
Condition of land at time of ploughing	Good	Good	Good	Good	Good
Other Cultivations	Cultivated with Springtyne in Sept., Oct., and Feb. after rains; harrowed after rains Feb., March, and April. Cultivated before planting. Planted with Combine	Cultivated with Springtyne during August, and again after rain end of Oct. and early Nov. Planted with Combine	Cultivated with Cross Disc in October and again prior to seeding	Cultivated with Springtyne prior to seeding	Cultivated with Springtyne three weeks prior to seeding. Planted with Combine with harrow attached
Variety ...	Merredin	Nabawa	Gluyas Early	Gluyas Early	Nabawa
Planted ...	Second week in May	Late April	First week in May	Middle of May	...
Rate of Seed ...	43	50	42	41	40
Graded ...	Yes	Yes	Yes	Cleaned	No
Treated ...	No	No.	Dry Copper Carbonate	No	Bluestone
Rate of Super.	75	90	70	60	60
Disease ...	Trace of smut	... Seed matted in patches.	...	Smut	... Seed matted in patches.

ZONE 5

(Judge: H. RUDALL, Field Officer.)

The alteration of the increased number of zones throughout the wheat belt applying to crop competitions is another step forward in their educational value. Societies as now grouped have a similarity of interests as regards climate, soils, rainfall, workings of the land, varieties and other contingencies to enable the farmer to solve that problem: "Am I obtaining the maximum my land will produce." I always feel that those who promote and engage in these competitions have a definite object in view, viz., the general improvement of their farm methods. There is room for improvement in every district, also, there are farmers who from their desire to obtain that maximum by improved methods consistently achieve better results than a number of their neighbours. Duly recognising that the prosperity of the town and its community depends on the prosperity of the farmer, local agricultural societies show their interest in the farmer by inaugurating these crop competitions and inviting—I was nearly writing the word "pleading" with—farmers to also show some enthusiasm by entering and obtaining the benefits to be derived therefrom.

Zone 5 has been spoken of as "the Wimmera of the Wheat Belt of Western Australia." If this be so, then I feel the honour was mine in being deputed as the judge of that zone.

It must be two or three years since I previously visited many of the farms there, and the distinct improvement in the farming methods generally was very noticeable. Surely these crop competitions can claim a little kudos for that improvement, viz., by the success and methods of the competitors coming under consideration, and from discussion by settlers in the district receiving wide publicity.

The season was one of anxiety during the growing period. May was a good sowing month, the falls not being too heavy to cause delay or render the soil boggy. June and July, which we term our wet months, were not up ot the average. August was very light, and, there being no surplus or carry over from the preceding three months, anxiety rode to its peak. It was interesting to learn from those farmers who had given attention to the cultivation of certain cultivated paddocks after the falls during the summer, that these crops showed no cause for worry during this anxious month, except the thought "how long can they last?" The timely falls during September and light showers and mild temperatures of October raised the average yield generally.

The average yield of this zone will be considerably augmented by those farmers who took advantage of the summer rains, and by conservation of the moisture, irrespective of whether it was needed or not, can now refer to the results from the working of their fallows as their "bank balance."

The average calculated yield of the 24 competitors in this zone works out at 21⅓ bushels. Why does the State average hover round 11 bushels? The details of awards and methods of cultivation are appended below each district concerned, but reference to some matters of common interest may be made here.

Use of Superphosphate.—The average rates at which superphosphate was applied in the different competitions were as follow:—Merredin, 81½lbs.; Bruce Rock (fallow and crop), 92lbs.; Robinson Cup, 56 ¼lbs., Doodlakine and Baandee, 78lbs.

Seeding.—The average amount of seed used in the Merredin competition was 46lbs.; in the Doodlakine and Baandee competitions 48lbs.; in the Bruce Rock fallow and crop competition, 49lbs.; and in the Robinson Cup, 48lbs.

Seed Treatment.—Merredin—No treatment, 3; dry treatment, 7; wet treatment, 1. Bruce Rock—No treatment, 4; dry treatment, 5; wet treatment, nil. Doodlakine and Baandee—No treatment, 1; dry treatment, 2; wet treatment, 1.

The Varieties used.—Nabawa, 13 entries; Merredin, 4 entries; Gluyas Late, 2 entries; Gluyas Early, 1 entry; Daphne, 1 entry; Sailor's Fortune, 1 entry; Federation, 1 entry; Canberra, 1 entry.

BRUCE ROCK AGRICULTURAL SOCIETY.

The Fallow and Crop Competition.

(Judge: H. Rudall, Field Officer.)

It is unfortunate for the society that the farmers of this district do not show the same keenness and enthusiasm as their neighbours at Merredin. Is it because they will have their fallow and crop competition combined? It must be disappointing to the competitor, whose whole crop was grown on

fallow, to be obliged to enter that 50 acres of crop which was grown on the competition fallow when he has another 50 acres which has responded better on other well-worked fallow, but was not eligible for the competition. It would be well for members of this society to thrash this matter out, and show their enthusiasm in these competitions if they wish their district to retain the title so often voiced in the expression: "the Bruce Rock community think their district is 'the London of the Wheat Belt.'"

The report on the fallow section was presented by Mr. Cass-Smith, B.Sc.Agric., therefore my comments must be the crop grown on that fallow.

Of the eight competitors in the fallow competition, five submitted the crops grown thereon. It is interesting to see a new enthusiast from one of the other suburbs, Mr. A. W. J. Brown, of Ardath, gained first honours.

It was a very nice upstanding crop, very even in height and density. Barley was a little too prevalent throughout, otherwise purity of type was well maintained. The undergrowth weeds were very few, a few patches of wild oats being responsible for the deduction in points. The yield must have been very gratifying, and should give Mr. Brown further encouragement to try to retain the honour and the further advancement of the district of Ardath.

Messrs. P. McCarthy & Son, of Eujinyn, just missed the coveted honour by a reduced yield. In the other sections of the details his and Mr. Lethlean's entry were quite up to standard. Both surface soils were loose and powdery, thought to be due to insufficient rainfall during the growing period to compact it. Neither of these competitiors pasture sheep, and crop and fallow is their rotation. Messrs. McCarthy's has had eight crops and six fallows, and Mr. Lethlean's nine crops and three fallows.

When one considers the good averages these farmers have had, the question might be asked whether the humus is not being burnt out of the surface soil and asserting itself more in lack of compaction on a light rainfall than on an average one.

Messrs. P. McCarthy & Son obtained first honours in the aggregate number of points for the combined competition, with Mr. Lethlean as runner-up.

Mr. Farrell must have been disappointed with the yield of his entry. On appearance it looked a 28-bushel return, not tall, but dense and well headed. On examination I found a number of heads with no grain development. Frequency of strangers were prevalent throughout.

The average calculated yield of the five competitors in this competition was 21 bushels.

BRUCE ROCK DISTRICT FALLOW AND CROP COMPETITION.

Name of Competitor.	Address.	Variety.	Calculated Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth	Total Crop.	Total Fallow.	Grand Total.
			40	20	15	15	10	100		
McCarthy, P., & Son No. 1	Eujinyn	Nabawa	22	18	14	14	8	76	92	168
Lethlean, J. ...	Bruce Rock	Nabawa	20	18	14	14	8	74	85	159
Brown, A. W. J.	Ardath ...	Nabawa	27	17	14	12	8	78	78	156
Farrell, F. C.	Eujinyn	Federation	20	17	13	12	7	69	81	150
McCarthy, P., & Son No. 2	Eujinyn	Nabawa	17	17	14	14	7	69	80	149
Smith & Sons	Yalberrin	Withdrew	...	...	...	...	...	...	88	88
Brown, S. A. ...	Bengullapin	do.	...	...	...	...	...	...	81	81
Leah, J. H. ...	Eujinyn	do.	...	...	...	...	...	...	73	73

Competitor ...	A. W. J. Brown.	McCarthy & Son (No. 1).	J. Lethlean.	McCarthy & Son (No. 2).	F. C. Farrell.
Years cropped	4 crops—1 fallow	8 crops—6 fallows	9 crops—3 fallows	6 crops—3 fallows	7 crops—1 fallow
Timber ...	Salmon, Gimlet, York Gum and Jam	Gimlet	Gimlet and Salmon Gum	Salmon Gum	Gimlet and Salmon
Ploughed ...	August	February, 1924	June, 1924	February, 1924	June, 1924
Make of Plough	Disc	Disc	Mould-board	Disc	Mould-board
Depth	3½ to 4 inches	4 inches	5 inches	4½ inches	4 inches
Condition of land at time of of ploughing	On the dry and hard side	Hard and day	Part very dry, balance damp	Hard and dry	Good although slightly on the wet side.
Other Cultivations	Cultivated with Sundercut in Sept.; with Springtyne in Nov., Feb. and March; planted with Combine	Scarified in July 4in. deep; three cultivations with Springtyne cultivator; scarified again in Jan, 1925; harrowed in Feb.	Cultivated with Disc in Sept.; two cultivations in Jan., 1925; again in Feb. and prior to seeding	Scarified in July 4in; cross cultivated with Springtyne four times to end of Jan., 1925; harrowed in Feb.	Cultivated with Springtyne in August and Sundercut in Sept.; harrowed in Oct., cultivated and harrowed in Jan.
Variety ...	Nabawa	Nabawa	Nabawa	Nabawa	Federation
Planted ...	Third week in April	Third week in May	Third week in May	Third week in May	Third week in May
Rate of Seed...	55	50	45	50	50
Graded ...	Yes	Yes	Yes	Yes	Yes
Treated ...	Dry pickled	Dry pickled	No	Dry pickled	No
Rate of Super.	80	90	90	90	100
Disease ...	...	...	...	...	...

RAINFALL.

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
Bruce Rock	213	110	39	39	147	267	164	22	128	67	795	37	76	1,309

BRUCE ROCK AGRICULTURAL SOCIETY.

The Robinson Cup Competition.

(Judge: H. RUDALL, Field Officer.)

This is the first year of this competition enabling farmers who had no entry in the fallow and crop competition to compete for crop only grown on fallow. The response was not as it should have been, there being only four entries. The average calculated yield in this competition works out at 23½ bushels, which must be very encouraging, and with a little more care

bestowed on other details in the award, these first competitors will have to be reckoned with by their older entrants in the fallow and crop competition. Now the numbers are up it is fitting that Mr. Mann should gain the coveted honours after winning the handsome cup for the best laid out farm.

Mr. Faulkner's entry was indeed a surprise to me, as I saw this country about four years ago uncleared of low bushy scrub and mallee, and never thought for one moment that such a fine upstanding and dense crop on that class of soil would be adjudicated to give a calculated yield of 24 bushels.

Mr. Cusbert and Mr. Foss's crops were, with the other two entries, up to crop competition standard, and by attention to other details the yields of all four competitors should be increased.

BRUCE ROCK CROP COMPETITION.

ROBINSON CUP.

Name of Competitor.	Address.	Variety.	Calculated Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Mann, R. ...	Shackleton	Sailor's Fortune	25	17	12	12	8	74
Faulkner, D. K.	Babakin ...	Daphne	24	17	12	13	7	73
Cusbert, L. C.	Bruce Rock	Nabawa	23	17	13	13	7	73
Foss, — ...	Ardath ...	Nabawa	23	17	12	11	7	70

Competitor ...	R. Mann.	D. K. Faulkner.	L. C. Cusbert.	—. Foss.
Years cropped	Five crops—one fallow	Two crops—two fallows	Four crops—one fallow	Three
Timber ...	Gimlet and Ti-tree	Jam and scrub	Salmon and Gimlet	Salmon, Gimlet, and Mallee
Ploughed ...	July, 1924	July, 1924	July, 1924	August
Make of Plough	Mouldboard	Mouldboard	Disc	Disc
Depth ...	3½ inches	3½ inches	4 inches	3 to 3½ inches
Condition of land at time of ploughing	Very hard	Good	Good	Medium dry
Other Cultivations	Cultivated with Sundercut in Sept. and April. No further cultivation	Cultivated with Sundercut in Sept. and with Springtyne in March, and again prior to seeding	Cultivated with Sundercut in August and with Springtyne in October. Cultivated with Sundercut twice during summer rains, and with Springtyne prior to seeding	Cultivated in October with Sundercut and with Springtooth cultivator in November and April
Variety ...	Sailor's Fortune	Daphne	Nabawa	Nabawa
Planted ...	First week in April	Second week in April	Third week in April	End of April
Rate of Seed...	60	60	45	50
Graded ...	No	No	Yes	Yes
Treated ...	No	No	Unpickled	Dry pickled
Rate of Super.	80	60	90	110
Disease ...	...	...	...	...

RAINFALL.

	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
Bruce Rock	213	110	39	39	147	267	164	22	128	67	795	37	76	1,309

THE MERREDIN AGRICULTURAL SOCIETY.

Teasdale Cup Competition.

(Judge: H. RUDALL, Field Officer.)

It must have been encouraging to the President and Secretary of this Society to receive 15 entries, and to find 11 of these submitted for inspection.

The average calculated yield of that number was 20½ bushels per acre. When the average yield for the district is obtained, it will be seen that still further improvement must take place in the methods of some of the non-competitive farmers if the average yield of the district is to be raised to its full capacity.

It was impossible for me to divide the two winning crops on inspection, but I was satisfied when the calculated yield was obtained, as there was a slight weakness in density along one side of Messrs Harling's entry.

Messrs. Teasdale Brothers have been consistent competitors, but each time have just missed the goal of ambition, but by obtaining first award this year they have now "a leg in" for the cup.

Both Messrs. Teasdale Brothers and Messrs Harling's entries were indeed pretty crops, and both competitors had taken precautions to add to their attractiveness by well-defined binder cuts. Purity of type was most marked, strangers were hard to find, and weeds few, consisting of stray wild oats with a little mustard and stinking roger.

MERREDIN DISTRICT CROP COMPETITION.

Name of Competitor.	Address.	Variety.	Calculated Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Teasdale Bros.	Belka ...	Nabawa	27	18	14	14	8	81
Harling, H. H. and H. G.	Belka ...	Nabawa	26	18	14	14	8	80
Clothier, J. ...	Merredin...	Nabawa	22	17	13	14	7	73
South, R. ...	Korbel ...	Merredin	21	18	12	14	8	73
Teasdale, J. S.	Korbel ...	Nabawa	23	16	13	12	7	71
Robartson Bros.	Nangeenan	Nabawa	22	16	13	13	7	71
Rowan, C. ...	Merredin...	Merredin	21	17	12	13	7	70
Clark, E. C. ...	Ulva ...	Merredin	19	17	13	13	7	69
Willis, G. A. ...	Burracoppin	Nabawa	16	16	13	12	7	64
Dumsday, L. ...	Goomarin	Nabawa	14	17	13	12	6	62
Clark, F. C. ...	Ulva ...	Nabawa	16	16	12	12	6	62
Pollock, R. ...	Belka ...	Withdrew						
Andrews, C. ...	Merredin...	do.						
Kay, John ...	Baandee ...	do.						
Teasdale, H. W.	Korbel ...	do.						

Competitor ...	Teasdale Bros.	Harling Bros.	J. Clothier.	R. South.
Years cropped	Six crops—One fallow	Eleven crops—two fallows	Five years	Six crops—First fallow
Timber ...	Salmon and Gimlet	Salmon, Gimlet, and Mallee	Gimlet	Gimlet
Ploughed ...	July, 1924	July, 1924	August, 1924	January, 1924
Make of Plough	Mouldboard	Disc	Mouldboard	Disc
Depth ...	4 inches	3 inches	3½ inches	4 inches
Condition of land at time of ploughing	Good	Wet but pliable	Good	Fairly good
Other Cultivations	Cultivated with Disc in Sept. and Springtyne in Feb., also prior to seeding	Cultivated with Springtyne in Sept. and March, and with Sundercut in April	Cultivated with Sundercut in Sept., harrowed in Jan.; cultivated with Sundercut in March, and harrowed before seeding	Cultivated with Springtyne first week in June to first week in Oct., 11 times; no further working until drilled and then ceased after first rain
Variety ...	Nabawa	Nabawa	Nabawa	Merredin
Planted ...	...	First week in May	Third week in May	Second week in May
Rate of Seed...	45	45	45	42
Graded ...	Yes	Yes	Yes	Yes
Treated ...	Not treated	Dry pickled	Dry pickled	Dry pickled
Rate of Super.	75	75	90	90
Disease ...	...	...	...	...

Competitor ...	J. S. Teasdale.	Robartson Bros.	C. Rowan.	E. C. Clark.
Years cropped	Four crops—two fallows	Four crops—four fallows	Six crops—three fallows	Four crops—first fallow
Timber ...	Salmon and Gimlet	Mallee and scrub	Gimlet and Mallee	Gimlet
Ploughed ...	June and July	July, 1925	July, 1924	August, 1924
Make of Plough	Mouldboard	Disc	Mouldboard	Disc
Depth ...	4 inches	4 inches	3½ inches	4 inches
Condition of land at time of ploughing	Moist; good order	Good	Good	Good
Other Cultivation	Cultivated with Disc in Sept. and in Jan. after rain, also late in Feb. Cultivated with Sundercut just prior to seeding	Cultivated with Disc in Sept. and twice more before seeding	Cross cultivating, ploughed in Sept. and March. Cultivated with Springtyne in April and harrowed after drill	Cultivated with Sundercut late Sep. and middle of March. Cultivated with Tandem Disc beginning of April. Skim ploughed prior to seeding
Variety ...	Nabawa	Nabawa	Merredin	Merredin
Planted ...	May	First week in May	Second and third week in May	Third week in May
Rate of Seed ...	45	60	50	45
Graded ...	Yes	Yes	Yes	Yes
Treated ...	No	Bluestone	Not treated	Dry pickled
Rate of Super.	70	112	90	80
Disease ...	...	...	...	...

Competitor ...	G. A. Willis.	L. Dumsday.	F. C. Clark.
Years cropped	Three crops—first fallow	Two crops—first fallow	Twelve crops—three fallows
Timber ...	Gimlet, Ti-tree and Salmon	Gimlet and Ti-tree	Gimlet
Ploughed ...	June, 1924	July, 1924	June and July, 1924
Make of Plough	Mouldboard	Disc	Mouldboard
Depth ...	4 inches	3½ inches	3 to 4 inches
Condition of land at time of ploughing	Good	Good	Mostly too hard to make a good job of ploughing
Other Cultivations	Cultivated with Springtyne end of August and end of Sept. Three harrowings between Sept. and seeding. Cultivated with Springtyne prior to seeding	Cultivated with Springtyne in Sept., harrowed in Jan. and Feb. Cultivated with Springtyne prior to seeding	Cultivated twice, once with Disc
Variety ...	Nabawa	Nabawa	Nabawa
Planted ...	Third week in April	27th April	21st April
Rate of Seed...	43	45	45
Graded ...	Yes	Yes	No
Treated ...	Dry pickled	Dry pickled	Dry pickled
Rate of Super.	60	90	65
Disease ...	...	...	...

RAINFALL.

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
Talgomine Downs, near Goomarin	280	102	51	21	96	163	140	25	91	29	544	...	...	...
Merredin Experimental Farm	235	136	43	27	104	147	134	18	98	53	554	5	26	1,026

THE DOODLAKINE AND BAANDEE DISTRICTS AGRICULTURAL SOCIETY.

(Judge: H. RUDALL, Field Officer.)

It is indeed poor encouragement so such an enthusiast as Mr. Barton, of North Baandee (who has presented a handsome trophy to be won over a certain period) to find such lack of enthusiasm amongst the farmers in the district connected with the Doodlakine and Baandee Agricultural Society.

Five entries were received, and of these four were submitted for inspection, one at Doodlakine and three at North Baandee.

Mesrs. R. Barton & Sons again headed the honour list with "Gluyas Late." It was not quite the standard crop of the same variety that obtained honour on my adjudication two years ago. The strangers had become more numerous, while the weed growth and unevenness were more pronounced. Nevertheless, it was a nice competition crop, and the height and calculated

yield testify to the farming methods adopted, especially when one notes the monthly rainfall during the growing period, which totalled 7.42 inches, with only 19 points for the month of August.

Messrs. Prowse Brothers submitted a nice crop of "Gluyas Early," but although well-grown and well-headed its density was not there to reach the calculated yield of Messrs. Barton's entry. The other details need attention to reach the definition of "an almost perfect crop."

Both Messrs J. W. & D. J. Spillman are consistent competitiors, and are to be commended for it. Mr. J. W. Spillman just missed second honours by the points allotted for calculated yield. Mr. D. J. Spillman was unfortunate through illness and other setbacks, in not being able to work the soil as he desired during the fallow period, it being of a heavy grey clay nature, which doubtless had an effect on the calculated yield.

The average calculated yield in this competition works out at 21 bushels.

DOODLAKINE AND BAANDEE DISTRICT CROP COMPETITION.

ZONE No. 5.

Name of Competitor.	Address.	Variety.	Calculated Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Barton & Son ...	North Baandee	Gluyas Late	26	17	13	12	8	76
Prowse Bros. ...	Doodlakine	Gluyas Early	22	16	12	13	7	70
Spillman, J. W.	North Baandee	Merredin	19	17	13	13	7	69
Spillman, D. J.	do.	Gluyas Early	17	16	12	13	7	63
Connolly, T. ...	Doodlakine	Withdrew						

Competitor ...	Barton & Son.	Prowse Bros.	J. W. Spillman	D. J. Spillman.
Years cropped	Five crops—three fallows	Seven crops—six fallows	Nine crops—four fallows	Eight crops—three fallows
Timber ...	York Gum, Mallee, Ti-tree	White Gum, Gimlet and Salmon	Salmon and Gimlet	Gimlet, York Gum, and Mallee
Ploughed ...	July, 1924	July, 1924	July, 1924	August, 1924
Make of Plough	Mouldboard	Mouldboard	Disc	Mouldboard
Depth ...	3½ to 4 inches	4 inches	3½ inches	3½ inches
Condition of land at time of ploughing	Good	Good	Hard and fairly dry	Hard and dry
Other Cultivation	Cultivated with Springtyne in August, January, and February, and prior to seeding	Cultivated with Springtyne drill in August and April	Cultivated with Springtyne in November and March. Disc cultivator ploughed and with Springtyne prior to seeding	Cultivated with Springtyne in March. Disc cultivator ploughed prior to seeding
Variety ...	Gluyas Late	Gluyas Early	Merredin	Gluyas Early
Planted ...	First week in April	Middle of May	End of May	Middle of May
Rate of Seed ...	45	45	60	45
Graded ...	Yes	By winnower	No	No.
Treated ...	Dry pickled	Dry pickled	Bluestone	No.
Rate of Super.	90	72	90	60
Disease ...	...	...	...	...

RAINFALL.

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
Doodlakine	160	155	65	21	155	223	155	9	123	52	717	9	36	1,163

ROYAL AGRICULTURAL SOCIETY.

As there was no crop competition held by the Kellerberrin Agricultural Society, Mr. J. Deane Hammond, of Kellerberrin, entered under the provision made by the Royal Agricultural Society for such a contingency. He is undoubtedly keen on these competitions, and although the local society does not show that enthusiasm which might be expected from such an old district, Mr. Hammond never misses a possible chance of competing—hence his entry with the Royal.

The awards made for his competition crop are as follows:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Hammond, J. D.	Kellerberrin	Canberra	30	18	13	14	8	83

The land on which the competition crop was grown, since being cleared of gimlet forest, has grown nineteen crops, and had been prepared for this crop by being ploughed with a mouldboard plough four inches deep during June and July, 1924. It was cultivated with a Springtyne cultivator three times during spring, disc cultivated in March, again cultivated with a Springtyne prior to seeding and harrowed after drilling. It was planted early in June with 60lbs. of graded seed which had been treated with copper carbonate to prevent smut. Superphosphate was applied at the rate of 112lbs. per acre.

The rainfall as recorded at Kellerberrin was:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	282	152	71	10	148	253	178	22	128	60	789	20	89	1,413

For champion honours for the zone Mr. Hammond registered a success with a nice crop of Canberra, having a yield of 30 bushels. It was very even, true to type, and considering it was the 19th year the paddock had been cropped, it was remarkably free from weed growth. Messrs. Teasdale Brothers were runners-up; further remarks on their crop being made under the heading of Merredin competition.

ZONE 6.

(Judge: I. THOMAS, Superintendent of Wheat Farms.)

Owing to the lack of further entries Mr. John McLean, of County Peak, via Beverley, the only competitor in this zone, was awarded the first prize for a fine crop of "Nabawa."

The competing crop of 50 acres was part of 200 acres of the same variety, and although a thorough inspection was not made of the whole area there appeared but little difference between the whole block and the portion offered for competition. Except for a few black oats there was very little weed growth. A little admixture and some barley was noticed, and also a few plants with loose smut. It was very even in height and stooling, and had made good growth. There was, however, a strip running through the plot which showed that the land had been water-logged, and which later had become crusted. This had caused the heads to ripen before being properly developed. The land had previously been fallowed and cropped nine times. For this crop the land had been fallowed four inches deep during the previous August, when the conditions were favourable. After being ploughed it was cultivated with a Springtyne cultivator twice, during late September and early October; during the summer after rain, and again in front of the drill. Planted with 65lbs. of graded seed which had been treated with Copper Carbonate. Superphosphate was applied at the rate of 100 lbs. per acre.

Winning Crop, No. 6 Zone. Grown by J. McLean, Beverley. 29 Bushels.

The rainfall during August was only 32 points, and the calculated yield of 29 bushels per acre is therefore very creditable, and indicates that the preparation of the land had been thorough, and that under such conditions good results can be expected even in a year of scanty rainfall.

Mr. McLean is very thorough in his methods, and has attained a very high standard as is shown by his good results in previous competitions.

The fallowed land of this competitor is always cultivated when required, but in addition his sheep are pastured over all his fallow to assist in the

control of the weeds. The effect of this practice is shown by the absence of weeds amongst the crops and is reflected in the number of points allotted for "freedom from weeds" in this year's competition, although the land had grown nine crops previously.

The points awarded are as hereunder:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
McLean, John...	County Peak	Nabawa	29	17	13	12	7	78

The rainfall as recorded at County Peak was:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	146	204	185	25	149	272	254	50	163	61	949	...	5	1,514

ZONE 7.

KULIN AGRICULTURAL SOCIETY.

(Judge: I. THOMAS, Superintendent of Wheat Farms.)

Though there were 13 entrants for this competition and this was the greatest number in any competition judged by me this year, only three of the competitors submitted their crops for inspection; those remaining in the competition were Messrs. L. & H. James, of Kondinin; Angus W. Trotter, of Gnarming; and P. J. Bowey, of Kulin.

The detailed points awarded are set out hereunder:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Trotter, Angus W.	Kulin Rock	Federation	22	18	12	13	7	72
Bowey, F. J. ...	Kondinin	Queen Fan	21	18	11	14	7	71
James L. and H.	Kulin ...	Gallipoli	17	19	13	12	8	69

It will be seen from these that the contest was a very close one, only two points separating the three competitors.

Mr. Trotter's prize winning crop was of the variety "Federation," and was calculated to yield 22 bushels per acre. It was, however, uneven in height, stooled irregularly and rather flaggy in patches. It was fairly free from weeds, but a few strange wheat plants and a trace of barley were noticed. A trace of Flag Smut was also present.

The second prize winning crop was of the variety "Queen Fan," and was calculated to yield 21 bushels per acre. The points for "unevenness of growth" were reduced owing to irregular height and uneven stooling, the crop being inclined to be thin in patches. The weed growth was similar to

that of the winner, and though it was somewhat freer from admixture there was a large quantity of Flag Smut and also some Ball Smut.

The third crop was of the variety "Gallipoli." This variety is very short in the straw, but is apparently not a fixed strain as there was a considerable variation in the character of the heads, which, however, were well filled. This crop was particularly free from weeds; was exceptionally even in height, but thin. There was some loose smut in the crop. This disease is very difficult, if not impossible, to control by seed treatment, and therefore it is advisable to obtain new seed from a crop known to be free from this disease. The control of the disease "Flag Smut" is also difficult, as the plants can become infected from the spores in the soil, and the soil can become infected with spores blown from the foliage of the diseased plants. When this disease is present it is recommended that the stubble be burnt as early as possible, and that the land be ploughed early in the following winter, and kept clean either by cultivation or by the pasturing of sheep. It is further advisable when possible to plant oats, but in the event of this being unsuitable, a variety of wheat such as "Nabawa" should be sown, as this variety has so far been found resistant to this disease.

The table herewith shows the different methods adopted by each of the competitors.

Competitor ...	Angus W. Trotter.	P. J. Bowey.	L. & H. James.
Years cropped	Second	Unknown	Third
Timber ...	York and Jam	Salmon and a little Mallee	Mallee and Gimlet
Ploughed ...	July	Early September	June and July
Make of Plough	Disc Cultivator	Mould Board	Shearer Disc
Depth ...	4 inches	3 inches	4 inches
Condition of land at time of ploughing	Good	Setting hard	Good
Other Cultivation	Cultivated with Springtyne in June and cross cultivated immediately after. Disc ploughed in July; cultivated in October, and planted with a Combine	Harrowed early in October. Cultivated with Springtyne in October. Harrowed after rain in February and planted with Combine	Skimmed ploughed in August. Planted with Combine with harrow attached.
Variety ...	Federation	Queen Fan	Gallipoli
Planted ...	Second week in May	First week in May	First week in May
Rate of Seed ...	60	56	45
Graded ...	Yes	Recleaned	Yes
Treated ...	Dry pickled	Bluestone	Dry pickled
Rate of Super.	90	75	80
Disease ...	Trace of loose and flag smut	Bunt and flag smut	Trace of flying smut

The rainfall as officially recorded at Mitchelldale, near Kulin, is:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	115	229	75	81	136	178	85	42	111	71	623	...	...	...
Kondinin	118	248	42	49	174	243	135	45	112	103	812	53	...	1,322

ZONE 8.

(Judge: I. Thomas, Superintendent of Wheat Farms.)

Mr. Michael Clifford, of Gilliminning, was the only competitor in this zone, but his competition crop of "Federation" was well worthy of the prize gained. It was somewhat uneven in height and had stooled irregularly, but the heads were well filled, it's calculated yield being 31 bushels per acre. There were few weeds present, "Cockspurs" being the most prominent. There were a few stray plants of another variety as well as traces of rust and ball smut.

Winning Crop, No. 8 Zone. Grown by M. Clifford, Gillimanning. Yield 31 Bushels.

Previous to being cleared the land had been timbered with York Gum, Jam, and Wattle. Portion of it had been cropped once previously, but the balance was new land. It was prepared for this crop by being ploughed with a mouldboard plough 5in. deep during July and August, when the

ground was in good condition for the work It was subsequently cultivated with a Springtyne cultivator during September and October, and four times during summer and autumn, and again prior to seeding. It was planted with 90lbs. of graded seed per acre, which had been treated to prevent smut. An application of 140lbs. of superphosphate was applied.

The points awarded are:—

Competitor.	Address.	Variety.	Yield.	Freedom from Weeds.	Freedom from Disease.	Freedom from Admixture.	Evenness of Growth.	Total.
			40	20	15	15	10	100
Clifford, M. ...	Gillimanning via Pingelly	Federation	31	17	12	13	8	81

The rainfall recorded at Wickepin, the nearest official station, was:—

—	Jan.	Feb.	Mch.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	80	139	114	45	153	266	241	36	148	104	948	...	131	1,475

THE CHAMPIONSHIP CROP COMPETITIONS OF THE ROYAL AGRICULTURAL SOCIETY.

GEO. L. SUTTON, Director of Agriculture.

With the object of stimulating interest in the District Crop Competitions which were initiated by the Royal Agricultural Society in 1921, the Society with the assistance of the Minister for Agriculture (Hon. M. F. Troy) has donated a champion prize of £10, and a reserve champion prize of £2 10s. for the best two crops in each zone into which the Wheat Belt is divided. Last year the Wheat Belt was divided into three zones for the purpose of these competitions, but this year the number was increased to eight. The object of the change was to enable all the competing crops in one group to be inspected and the awards made by the same judge. The innovation was successful, although it entailed a certain amount of strenuous work on the part of the judges owing to the distance to be travelled, and the short time during which the crops are suitable for judging, and therefore the limited period which is available for this work.

The entrants for these championship prizes are the first and second prize winners of the district competitions. A map showing the location of the different zones will be found in the article in this Journal dealing with the District Crop Competitions. Where the district agricultural societies make no provision for crop competitions farmers desiring to compete may enter for those competitions directly with the Royal Agricultural Society.

The competitors in the different zones and the total points allotted to each are shown in the table hereunder. As in former years the crops were judged by the departmental officers attached to the Wheat Branch, and the detailed marks allotted will be found in their reports of the District Crop Competitions:—

ZONE CHAMPIONSHIPS.

Representatives from District Crop Competitions.

Zone.	Name and Address.	Variety.	Total Points, 100
1	Hebiton & Sons, Three Springs *	Nabawa	83
	Carter & Sons, Three Springs	Gresley	68
2	Bradford Bros., Damboring	Nabawa	78
	A. H. Court, Dalwallinu	Nabawa	76
3	Hughes Bros., Minnivale	Nabawa	87
	J. Lindsay, Wyalcatchem	Gluyas Early ...	84
	R. B. Ackland, Wongan Hills	Nabawa	83
	R. Sommers, Wongan Hills	Nabawa	81
4	B. W. Hopwood, Bencubbin	Merredin ...	75
	F. C. Weyman, Bencubbin	Nabawa	69
	Creagh Bros., Nungarin	Nabawa	73
	Creagh, William, Nungarin	Gluyas Early ...	72
5	J. Deane Hammond, Kellerberrin *	Canberra ...	83
	Teasdale Bros., Belka	Nabawa	81
	H. H. & H. G. Harling, Belka	Nabawa	80
	A. W. J. Brown, Ardath	Nabawa	78
	P. McCarthy & Son, Eujinyn	Nabawa	76
	Barton & Son, North Baandee	Gluyas Late ...	76
	Prowse Bros., Doodlakine	Gluyas Early ...	70
6	J. McLean, County Peak*	Nabawa	78
7	Angus W. Trotter, Kulin Rock	Federation ...	72
	P. J. Bowey, Kondinin	Queen Fan ...	71
8	M. Clifford, Gillimanning*	Federation ...	81

* No District Competition.

The awards will, therefore, be: -

Zone 1.—	Messrs. Hebiton & Sons	1st
	Messrs. Carter & Sons	2nd
Zone 2.—	Messrs. Bradford Bros.	1st
	Mr. A. H. Court	2nd
Zone 3.—	Messrs. Hughes Bros.	1st
	Mr. J. Lindsay	2nd
Zone 4.—	Mr. B. Hopwood	1st
	Messrs. Creagh Bros.	2nd
Zone 5.—	Mr. J. Deane Hammond	1st
	Messrs. Teasdale Bros.	2nd
Zone 6.—	Mr. J. McLean	1st
Zone 7.—	Mr. Angus W. Trotter	1st
	Mr. P. J. Bowey	2nd
Zone 8.—	Mr. M. Clifford	1st

In addition to the above awards, a special prize of five guineas is donated by the Royal Agricultural Society for the fifty acres giving the highest yield in any zone. This award was won by Messrs. Hebiton & Sons, of Three Springs, whose crop was calculated to yield 34 bushels per acre.

The number of entrants this year in the District Competitions from which the entrants to the Royal Competitions are drawn was 83, but prior to the judging 24 of these withdrew. Some of these were, no doubt, influenced by the effect which the adverse character of the season had upon their crops, and the withdrawal of such a large number reduced the number of competitors to 11 less than last year, from which it might be concluded that the interest in these competitions is declining. This, however, is not believed to be the case—any lack of interest is more apparent than real.

The number of competitors and districts represented since these competitions were initiated is as hereunder:—

	1921.	1922.	1923.	1924.	1925.
Number of Districts ...	...	...	12	15	13
Number of Competitors ...	15	32	82	70	59

As provided by the conditions of the competition all crops are to be on fallowed land. The almost general practice of all competitors is to carry out the initial operation in connection with their fallowing prior to the end of August; of the 48 competitors in the District Competitions who furnished information on this point three followed the Wimmera practice, and broke up their land during the summer—one in January, and two in February—and of the remaining 45 there were 25 who commenced their fallowing early in the recognised winter fallowing season of June, July, and August. Of the district winners three commenced fallowing in June, eight in July, and two in August, and these last were in the later districts of County Peak and Gillimanning. The implement most favoured for this work was the plough—28 used Mouldboard ploughs, 15 Disc ploughs, three "Sundercut" cultivators, and one each a Disc cultivator and a Springtyne cultivator. Of the 13 winners 12 used the plough, and one used the Disc cultivator, with which the ground was worked four inches deep.

The depth of ploughing most favoured is four inches—39 competitors ploughed this depth, seven between three to four inches deep, and one five inches. Of the 11 district winners from whom details in this connection were obtained, the depth to which the fallowed land was broken by two competitors was between three and a-half and four inches, by seven competitors four inches, and by two others four and a-half and five inches.

Though the cultivation of the land after its initial working varied in detail and according to circumstances, the general practice was fairly uniform. In all cases the ploughed land was cultivated in the spring during the months of September and October; 36 continued the cultivation when required after rain in the summer, and all cultivated the ground immediately prior to seeding. Such variation in detail is always to be expected for the number of cultivations given the fallowed land in the spring and even though the summer is obviously governed by the character of the soil, the climatic conditions and the weed growth, and these also determine the type of implement to be used. If the ploughed land is in good condition and clean a "Springtyne" cultivator is generally used for the first cultivation, but if hard or weedy the fallowed land is usually turned back with a "Skim" plough, Disc cultivator, or "Sundercut." The object aimed at is to secure a seed bed free from weeds, and covered by a shallow mulch of about two inches deep to protect a compact layer beneath from evaporation.

The period during which seeding took place ranged from early in April to early in June, and it is interesting to note that both the earliest and latest sown crops were winners in their respective zones. The popular sowing month is undoubtedly May, for of 48 competitors 30 seeded in this month; of the remainder three planted early in April, 14 late in April, and one early in June. It is important to call attention to this last planting, which was by Mr. J. Deane Hammond, of Kellerberrin, and who with such late planting, and with 743 points of rain from May to October, inclusive, obtained the magnificent calculated return of 30 bushels per acre. In view of the results obtained at the Merredin Experiment Farm within the same zone, and where the mean yields from June planting for the past three years have been 13 per cent. less than those obtained from the May plantings, such a result must be regarded as exceptional, but it calls attention in a significant way to the possibilities of late planting on well-prepared land, and in consequence the advisability on weedy land of waiting until after the autumn rains to destroy weed growth. It is of further interest to call attention to the fact that this splendid result was obtained on land which has been under cultivation for 19 years.

Of the varieties used "Nabawa" was undoubtedly the favourite, and was sown by 30 competitors. The other varieties planted were "Gluyas Early" by eight competitors, "Merredin" by six, "Federation" by four, "Gluyas Late" by three, "Sailor's Fortune" by two, "Onas," "Daphne," "Canberra," "Gallipoli," and "Queen Fan" by one each. Of the 13 district winners eight planted "Nabawa," two "Federation," and one each "Merredin," "Gluyas Late," and "Canberra."

The most popular amount of seed was between 45 and 50 lbs.; this quantity was used by 24 competitors of 58 from whom details were obtained. Seven used less than 45 lbs., 24 between 45 and 50 lbs., four between 50 and 55 lbs., 16 between 55 and 60 lbs., and seven over 60 lbs. Of the 13 winners

five used between 45 to 50 lbs., five between 55 and 60 lbs., and three over 60 lbs. The most Easterly and earliest districts favour the lowest rate of seeding.

Treatment with copper powders is now the favourite treatment for the prevention of bunt; of 48 competitors 25 used this method, six the wet treatment with bluestone, and 17 failed to treat their seed.

Observations regarding the presence of bunt are recorded by the judges in connection with eight winning crops. In the case of one of these the seed was not treated, and this crop had bunt in it; of the other seven no bunt was found in five, and only a trace in two. Of 23 competing crops, which were known to be treated, 19 were free from bunt, whilst in 12 untreated eight were bunted. Presumably the seed of the crops which were not treated was apparently free from smut spores and yet 66 per cent. were bunted. The obvious conclusion is that even clean seed should be treated unless it has been specially grown from seed treated the previous year.

The fact that four of the 23 treated crops showed even a trace of smut indicates the need for greater care in connection with this feature of routine farm practice. It may be remarked here that in the case of the dry treatment the failure is due to improper mixing of the dust with the seed, and this may have been owing to faulty manipulation of the machine or appliance used. Because of this the treated seed should be regularly examined to see that it is being thoroughly covered with the dust. These competition crops contained far more ball smut than should be the case at the present time, when such proved and effective remedies are known. In no crop should there be more than a trace.

Superphosphate was applied with all crops; the amount ranged from 60 to 140 lbs., with a mean of 80 lbs. There is a tendency on the part of the winners to use larger amounts than the other competitors, for only three of them used less than the average of 80 lbs., whilst 25 of the remaining competitors used less than this quantity. The average of the amounts used by the winners was approximately 100 lbs., and the quantities applied to the four highest-yielding crops of 30 bushels and over was 140 lbs. in the case of one, and 1 cwt. in the other three.

The presence of Flag Smut was noticed in quite a number of the competing crops, and it was apparently more noticeable this season than previously, which indicates that it is on the increase in the State. Growers should not neglect the warning now being given by its presence in these crops, and should take steps to control it first by the inclusion of an oat crop, as well as fallowing, in the system of cropping, and also by the selection of varieties proved resistant to this disease. Fortunately "Nabawa,' which is also a consistent yielder, has so far proved satisfactory in this respect.

The results of these competitions combined with the work of the Experiment Farms, which they are confirming, are enabling the routine methods of farm practice to be standardised in connection with wheat-growing in this State. Guided by the work of the Experiment Farms, supplemented by the result of these competitions, standard routine methods necessary for the highest yields may be stated to be:—

(1) Fallow early during the months of June, July, and August; the initial working to be at least four inches deep.

(2) Cultivate the fallowed land in September and October if clean; if weedy or hard "turn it back" with "Skim" plough, "Disc" cultivator, or "Sundercut" cultivator; also cultivate in summer if the mulch is destroyed by heavy rain.

(3) Plant after rain, preferably in May.

(4) Use from 45 to 60 lbs. of properly treated seed.

(5) Apply liberal dressings of fertiliser, about 100 lbs. per acre.

The calculated yields of the winners in the different zones, and the average yields of all competitors in them will be found in the table hereunder:—

Zone.	District.	Yield of Winner.	Average Yield.
1	Three Springs	34	27½
2	Dalwallinu	26	20½
3	Dowerin	32	27¾
3	Wongan Hills	31	28
4	Nungarin	19	20
4	Mt. Marshall	22	17¼
5	Kellerberrin	30	30
5	Doodlakine and Baandee	26	21
5	Merredin	27	20½
5	Bruce Rock	27	22¼
6	Beverley	29	29
7	Kulin	22	21½
8	Gillimanning	31	31
...	Average	27½	22½

Though the difference in the climatic conditions of different seasons makes comparisons difficult, it is interesting to note the variation in the average yield of the crops in this competition since its initiation. The average yields for the different years are:—1921, 25 bushels; 1922, 24 bushels; 1923, 29 bushels; 1924, 31 bushels; 1925, 22½ bushels.

Though the average yield this year is less than that of any previous year this in no way indicates that the standard of these competitions has fallen. The reverse is the case. The decline is entirely due to the character of the rainfall, which ranged from 544 points to 1,117 points during the growing period. This, in most instances, was not only below the average, but in addition was characterised in all cases by an almost entire absence of useful rains for about six weeks prior to the first week in September, a period which is extremely critical during the growth of the wheat plant in this State. In no case was there more than 50 points recorded during the month of August. The good average yield of the crops under the conditions which obtained was a surprise, and that of the winners a triumph for modern scientific methods. Blind indeed to his own interests must the grower be who, following old methods with their lower yields, does not decide to abandon this old practice and adopt the new and safer one.

Plate 1.
Typical die-back of orange tree due to Exanthema.

EXANTHEMA.

(A Dieback of Orange Trees.)

W. M. Carne, F.L.S.,
Economic Botanist and Plant Pathologist.

Exanthema, though not one of our important citrus diseases, occurs more or less throughout our orange-growing areas. It is not infectious or due to parasitic organisms, but is a result of unsatisfactory conditions for plant nutrition, especially in relation to soil moisture. Exactly how it is brought about is not understood. It is evident, however, that it is a condi-

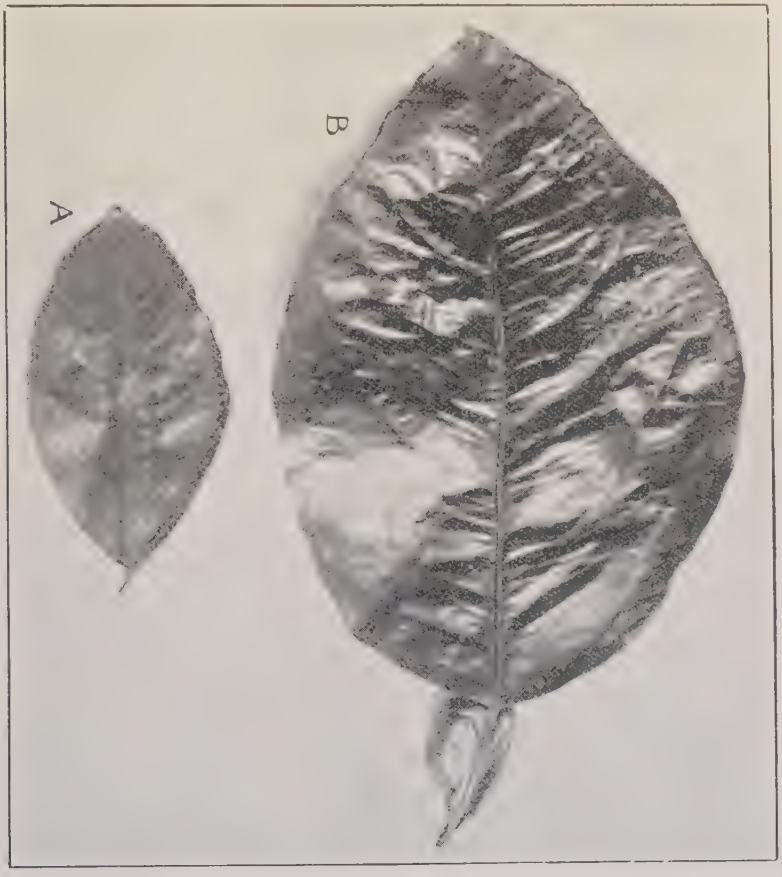


Plate 2.

A. Normal orange leaf.

B. Abnormally large leaf on water shoot affected with Exanthema. This leaf was 8½ inches long.

tion connected with the physical nature of the soil and subsoil in some cases; in others with drainage; and yet again with the excess or deficiency of available nitrogen. As a consequence the same treatment does not necessarily give the same results under different conditions. For instance, though the use of stable manure is beneficial in California and in New South Wales, its action is the reverse in Florida.

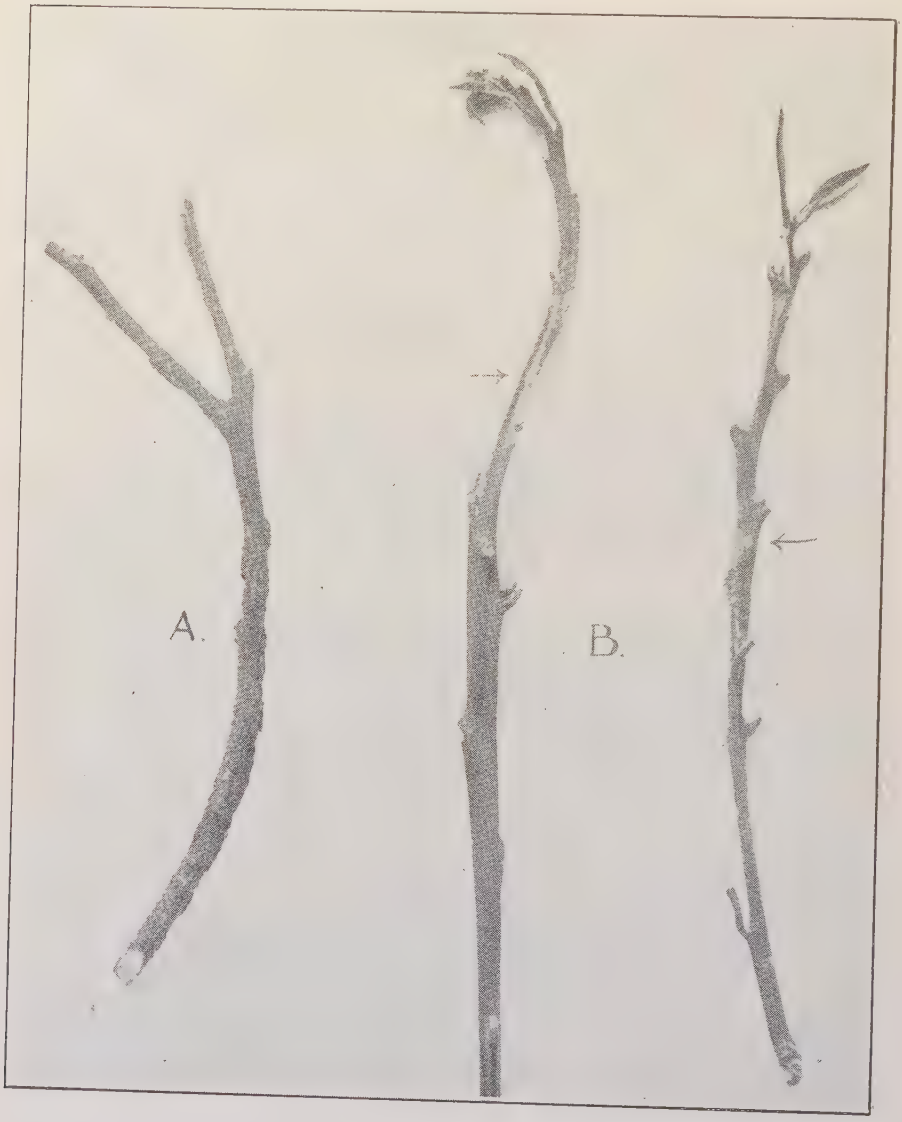


Plate 3.

A. Branch showing cankerous ruptures typical of Exanthema.

B. Gum pockets on young shoots which eventually produce the cankerous growth shown in A.

Exanthema in this State occurs principally on light or gravelly soils with a stiff or gravelly subsoil. Seasonally its occurrence varies considerably. 1920 was a bad year, but since then it has given little trouble except on occasional trees.

Badly affected trees show typical dieback (Plate 1). The fruit is discoloured and cracked (Plate 4).

There are certain symptoms by which Exanthema may be detected even in the early stages. These are given so that the disease may be recognised and treatment applied before the trees become badly affected. It is a commonplace truth that it is easier to check trouble at its beginning than to attempt to revive the healthy growth of a badly affected tree:—

1. The leaves on strong water-shoots tend to be abnormally large and coarse (Plate 2). These shoots also have a tendency to droop outward, and to grow upward at the end, forming an S-shaped curve.

2. Young shoots develop small blister-like swellings or gum pockets (Plate 3). If opened these will be found to contain a clear gum. Later these gum pockets develop into longitudinal ruptures edged with rough brown ridges. During wet weather gum exudes from these ruptures. Once formed the cankerous growth persists and may be found on the older branches of trees which have long since thrown off the disease.

3. Affected shoots tend to drop their leaves and to die back. The growth of laterals from the bases of the dead twigs produces a typically bunchy habit. This is increased by the fact that growth buds on affected trees frequently develop in clusters instead of twos. These give rise to bunches of weak shoots.

4. The fruit is small and is spotted or blotched with irregular brown markings which become hard and dry, finally splitting. (Plate 4).

Plate 4.
Oranges showing staining and cracking due to Exanthema.

Control.

1. Selection of site: As already pointed out, Exanthema occurs principally on light or gravelly soils with a stiff subsoil. Such soils cannot be regarded as suitable for oranges. Lemons do much better on them.

2. In California and in New South Wales a good dressing of stable manure—about half a cartload per tree—has given good results. This is well worth trying here when the manure is available.

3. Experiments by Mr. G. Wickens, Officer in Charge of Fruit Industries in this State, have shown very favourable results from the use of copper sprays. One spraying of Bordeaux Mixture (4-4-40) applied in August or September appears to be sufficient for a year or more in most cases. The trees should not be sprayed unnecessarily as copper preparations are liable to be followed by an outbreak of scale insects.

4. When Exanthema is bad, however, the condition of the trees is evidence that the soil and situation are unsuitable for oranges, and that the most reasonable procedure would be to root them up and to plant mandarins, lemons, or stone fruits in their place.

JAM AND JELLY MAKING.

Margaret A. Wylie,

Inspector and Organiser of Domestic Science, Education Department.

At this season of the year, when fruit is abundant, a few directions on the making of jam and jelly should not be amiss.

Floating about in the air, and unseen to the naked eye, are tiny organisms which have power to reproduce their kind. These are of numerous varieties: some consist of minute plant life, the spores of which seem to be just waiting for soil suitable to their growth, where they become visible in forms such as moulds and yeast; others known as bacteria are micro-organisms which form masses or colonies, and cannot be seen except with a microscope.

The processes of jam making and fruit preserving cannot be adequately dealt with unless the action of these be considered, as they are the chief causes of fermentation. Another class of ferment which should be mentioned are enzymes. These are the natural ferments found inside fruits, vegetables and grains, and which in the course of development break down cell walls which enclose them, giving rise to gases which spoil the fibre of the fruit and cause decomposition.

Moulds, of grey or brownish colour, are seen on decaying fruit. As a rule they thrive in dark damp places where there is little or no circulation of air. They grow rapidly and change in colour as they get older. Their necessary foods are sugar and starch. The spores of these moulds drop from the plant on to exposed food, and immediately grow and send down roots into this food soil. This may be seen in the quick decomposition of stewed fruit, which is only partially preserved with but a small percentage of sugar, and cooking only sufficient to break down the fibre. Consequently a short time sees acid fermentation begun, gases being generated and given off and mould forming. Much the same thing happens in the case of jam and jelly when its manufacture has been carried out in a haphazard fashion.

The Fruit.

This should be suitable, and at that stage of ripeness when it contains most pectin. Pectin is fruit jelly, and is found in just under-ripe fruit in larger quantities than at any other time. This substance enables jam to "jell." Fruit, therefore, should be jelly ripe for jam and jelly if the best results are to be achieved. By "unripe" is meant that stage when fruit is coloured and firm, yet not ready for eating. In over-ripe fruit sugar preponderates. When fruit is ripening pectin is converted into sugar. Jams and jellies made with fruit that has been plucked a long time or is very over-ripe will candy or ferment and turn mouldy. Sometimes it is necessary to add a little citric acid to draw out the pectin and hasten the "jell" point.

In up-to-date factories a jellometer is used to determine the amount of pectin in the juice; also a saccharometer to determine the amount of sugar present. The usual mistake in jelly making is the addition of too much sugar, the result being a syrup instead of a "jell."

Almost any variety of fruit is suitable for jam making, though some are preferable to others. With few exceptions fruits are treated in the same way. Oranges and lemons, on account of their jellying properties, will stand a large addition of water. Mulberries, lacking in pectin, will not jell unless other fruit, strong in acids, such as apples and lemons, are added to them. A frequent cause of failure is the use of damaged fruit. It is often too sweet and has lost its true flavour.

Sugar.

The part that sugar plays in jam and jelly making is that of a preservative. Excessive sugar will not cause mould, but excess of sugar takes from the quality of the article in respect to flavour and appearance. Each variety of fruit has its distinctive flavour and colour, more or less delicate and delicious. Every care should be taken to preserve these. For household purposes ¾lb. of sugar to 1lb. of prepared fruit for jam is a good formula; for jelly one cup of sugar to one cup of strained liquid. Circumstances alter cases, however, and if the housekeeper wishes to excel, she should use her powers of observation and keep notes from time to time for future reference. The best granulated sugar should be used, and damp dark sugar strictly avoided.

Method for Jams.

The methods of making the different types of jams vary very little. As a general rule the addition of a little water to the fruit adds to its clearness, and prevents burning before the juices commence to flow. It is possible, but not easy to make jams without a proper preserving pan. Iron pans should never be used, as they spoil the colour and flavour. Strong enamel iron pans are best, and with care will last a lifetime. These should be fairly shallow to assist speed in boiling. A large wooden spoon (or child's wooden spade for preference) should be used for stirring. Jam jars should be in readiness; glass jars have replaced the delf of olden times. Glass bottles are cheaper than jars, but for convenience sake should have wide necks. The receptacles should be clean and dry. Just before using they should be heated, not only to prevent the hot jam from cracking them, but also to dry off any moist air in the jar or bottle. Coverings of white paper and labels should also be in readiness. Avoid use of tin lids unless the proper and complete process of sterilisation is carried out. The preparation of fruit is of importance, and differs according to the variety. If freshly picked, the bloom should be rubbed off. Plums, nectarines, and peaches should be cut in two, and the stones removed. Crack quarter of the stones of nectarines and peaches, and cook the kernels with the fruit.

General recipe for making stone and berry fruit jam:—

Ingredients—

6lbs. of prepared fruit.
4½lbs. of sugar.
A little water (about a pint).

Method—

Boil fruit and water until the fruit is soft.
Gradually add sugar, stir frequently, and boil until "jell" point is reached.
Bottle while hot.
Cover when cold.

When stirring cannot be carried out regularly, it is advisable to have a sheet of asbestos under the pan to prevent the preserve burning, but it should be borne in mind that the quicker the process is carried out the better will be the appearance of the completed product, and the more bright and sparkling it will be. Over-boiling weakens it, and in the end destroys the jellying properties of the fruit, and the jam often becomes sticky and viscous. To test for the jell point put a small quantity (one teaspoonful) in a saucer and place in a draught of air. If it completely sets the jell point is reached, and the jam is then ready for bottling.

Jelly Making.

To be brief, the aim is to get jelly with both good colour and flavour, as well as a clear and sparkling appearance. When slipped out of the glass it should retain its form and cut clean with a knife. It is often thought that only apples, quinces, and citrus fruits are suitable for jelly making, but as a matter of fact English gooseberries, Cape gooseberries, grapes, passion fruit, and melons make excellent jellies. The same degree of ripeness of the fruit should be observed as in jam.

Cleanliness and care are indispensable. The fruit should be clean, and all utensils and cloths scrupulously so.

Directions—

(1) Wash fruit, cut apples and quinces into four or six pieces without removing skins. Grape and berry fruits crush a little.
(2) Put fruit in preserving pan with sufficient cold water to cover well.
(3) Bring to boiling point and boil gently until fruit is soft, stirring occasionally.
(4) Pour into a jelly bag and allow to drip. Do not disturb the pulp. It is advantageous to strain the liquid a second time, pouring it through the pulp.
(5) Measure strained liquid.
(6) Place again in pan, bring to boiling point and add sugar (one cup of sugar to one cup of liquid).
(7) Boil quickly till it jells (about 20 minutes).
(8) Remove any scum before potting.

Note.—A chair turned upside down on the table may be used as a frame for the straining process. Fasten a clean tea-towel by its corners to the ends of the legs, allowing it to sag a little. Place a basin underneath to catch the fruit juice.

LOTUS MAJOR (*Lotus uliginosus*, Schk).

Legend:

A. Flowering stem. B. Leaf. C. Inflorescence. D. Flower. E. Pods. F. Seed.—F1. *Lotus corniculatus*, F2. *Lotus uliginosus*. G. Pod after dehiscing. H. Basal habit. A., E., and H. slightly reduced; B. and G. natural size; C., D., and F. variously enlarged.

LOTUS MAJOR.

(*Lotus uliginosus,* Schk.)

W. M. Carne, F.L.S., C. A. Gardner, and A. B. Adams.

Lotus major is the commercial name used for *Lotus uliginosus,* Schk., the true *Lotus major,* Scop., not being cultivated here. It is a perennial Birdsfoot Trefoil which thrives in the moister soils of the South-West as far north as Gingin, and will doubtless succeed in any swampy soils provided that they are not alkaline. It is the best of the clover-like plants for wet peaty swamp lands, and is well worth sowing in the South-West in all soils which, during the Summer, retain moisture close to the surface.

Like Strawberry Clover, *Lotus major* will withstand submersion for long periods, and also roots at intervals where its stems come in contact with the soil. It also throws out underground stems, which enables it to spread even when stock graze it so heavily that it has little chance of forming seeds. Most of the growth is made during the Spring and early Summer, but under suitable conditions it will continue to grow until the early Winter frosts occur.

The best time for sowing is in the early Spring after the frost period. In swamps carrying rushes with bare patches between them the seeds may be sown between the clumps of rushes before the surface water dries up. The growth of roots and subterranean stems will in time give stock access to ground which otherwise would not have supported them. By continually grazing and trampling on this ground stock will reduce the growth of the rushes and may eventually totally destroy them.

When plants are available the stems may be cut into short lengths and thrown into the damp places so that stock can tread them into the soil.

Lotus major is difficult to establish on land carrying a strong growth of grass. Under these conditions the planting of roots is more successful than either of the previous methods. On land which can be cultivated heavy sowing is not advisable. About 5lbs. of seed per acre should be used, and the seed lightly covered over by means of a brush harrow. In most cases, however, it will be sufficient to sow lightly in and around damp places. Once established the plants will, under suitable conditions, soon spread. The use of a phosphatic manure, such as 1cwt. of superphosphate per acre, is essential with this as with other clovers and similar plants.

The seeds of *Lotus major* are small, 1 lb. containing about 500,000. In colour they are olive green, greenish brown or brown, uniformly one colour. In shape they are somewhat heart-shaped or almost round, and they are not speckled. The price of the seed is 6s. to 7s. per lb. Samples usually contain seeds of the annual *Lotus hispidus* if from New Zealand. The European samples are nearly pure.

Description of Plant. —A spreading perennial sparingly-hairy herb, spreading to a diameter of about five feet, emitting underground creeping stems, the low prostrate stems rooting at intervals, the branches erect, the roots fibrous. Leaflets usually ovate or obovate and pointed, sometimes narrow; the two lowest ones uneven-sided and broader. Flower stalks much longer than the leaves, bearing umbels of from 5-12 flowers golden yellow in colour. Calyx teeth about the length of the tube. Pod usually about 1in. long containing numerous seeds separated by a pithy substance which nearly fills the pod.

The species is native to Europe and the Mediterranean region, inhabiting moist meadows, ditches and shady or swampy places.

THE GREEN TOMATO BUG.

(*Nezara viridula*, Linn.)

(Order, Hemiptera; Family, Pentatomidæ.)

L. J. NEWMAN, F.E.S.,
Entomologist.

This pest was first brought under our notice in the year 1920. It was found to be attacking tomatoes, beans, potatoes, and other garden plants around the port of Bunbury.

On the pest being discovered prompt warnings were issued through the Press advising the public of the danger of spreading the bug by the distribution of seedling plants, etc. Like many other warnings issued it went unheeded, and as a result the pest has been spread far and wide in the South-West.

Once the bug is introduced into a district it rapidly spreads by means of its own powers of flight. To date it has not become a serious pest in the metropolitan areas, being only recorded here and there. It will, however, be only a matter of a year or two before it will prove troublesome.

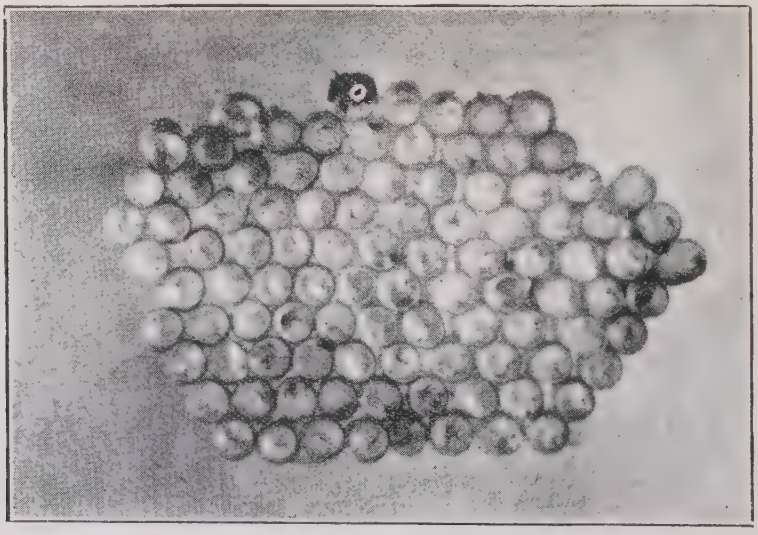
This bug was described by Linnaeous in Europe as far back as 1758. It is recorded from Europe, Asia, Africa, North America, India, and Eastern and Western Australia.

What we have to realise is that it has established itself in our State, and will prove a serious annually recurring plant and fruit pest.

Like all the plant feeding bugs it is a sap-sucking insect. The plants observed to be attacked locally are the following:—Beans, tomatoes, potatoes, egg plant, lucerne, maize, peas, cotton, citrus fruits, pears, stone fruits, vines, rhubarb, and many other garden plants. In fact it is most cosmopolitan in its selection of food plants.

LIFE HISTORY.

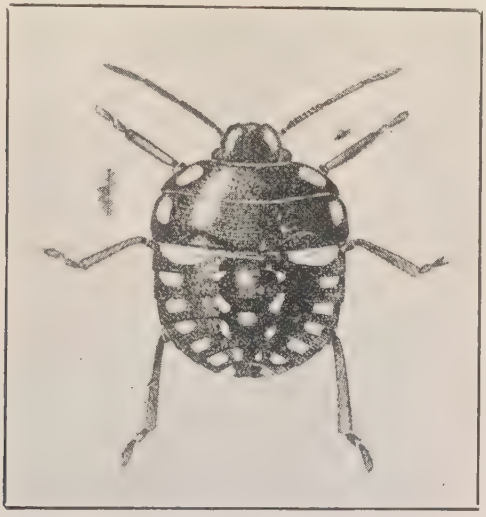
Eggs.—These are white and are deposited in clusters of various numbers up to 100, side by side usually upon the foliage. The eggs take from



Typical egg mass of Bug. Enlarged (original.)

eight to ten days to hatch according to the weather conditions. Upon reaching the hatching stage the young bug pushes off the cap-like top of the egg and emerges.

The nymph or young bug on emergence is dark coloured with a distinct blotch on the centre of the thorax and the abdomen striped. Five *instars* or



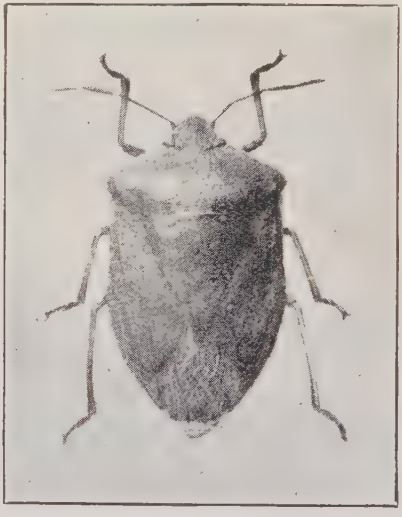
Second nymphal stage after leaving egg.
Enlarged. (Frogg.)

moults are passed through, the insect appearing after each larger and with a varying pattern of white and yellow markings on a black back ground. After the fourth moult the bug comes forth with definite wing pads; antennæ

Fourth or final nymphal stage.
Note wing pads forming.
Enlarged 3 times. (Original.)

four-jointed, green, shading to brown at tip; thorax pale green with scattered black spots; abdomen in the main pale green with central portion red surrounded with white markings; the lateral margin of the abdomen, and the outer margins of the thorax are margined with a band of pale red. After the fifth and final moult the full adult winged insect appears. The time taken to go through the various moults is from six to nine weeks. At first it is very light in colour, but in an hour or two the insect has assumed the foliage-green colour so typical of this bug.

The adult female bug is oblong oval in form, measuring on the average about five-eighths of an inch long; the male rarely exceeding half an inch. The colour is a striking green on the dorsal or top, and of a paler green on the ventral or under side. The head, thorax and elytra are densely covered with minute punctures. The antennæ and legs are pale green merging into brown at the last two segments of the antennæ and the tarsus or feet. The rostrum or beak is light brownish in colour, and is carried in a folded back position under the head and thorax. There is a total dissimilarity in colour



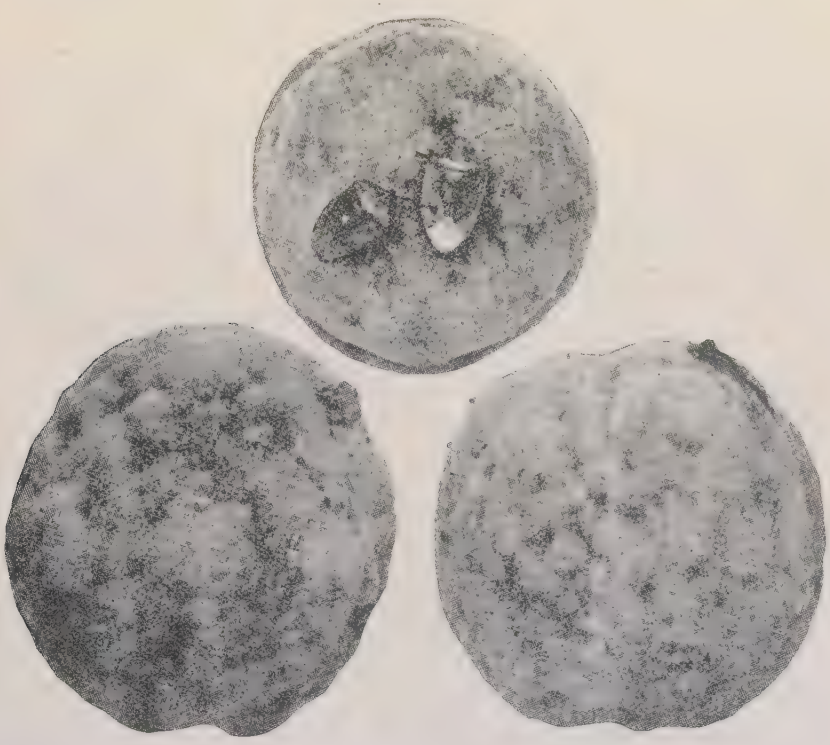
Adult or Imago stage. Enlarged 3 times. (Original.)

and markings between the prewinged and winged stages of this bug. This great variation has led many growers astray in that they do not connect the varied coloured nymphs with the adult green bugs. They are one and the same insects. The adult bugs live several months, and there are a number of generations during the period from October to May.

Character of Injury.—This bug begins its active work about mid October. There are slight indications of the presence of the pest in September should we experience warm days; even in winter I have observed the bug come forth and sun itself. Under ordinary conditions this insect does not come out permanently from its hibernating quarters until warm weather is

assured. Cold and wet weather are great factors in the control. As soon as the weather becomes wet and the temperature is lowered, the adult male and female bugs then living seek winter quarters wherein to hide and hibernate.

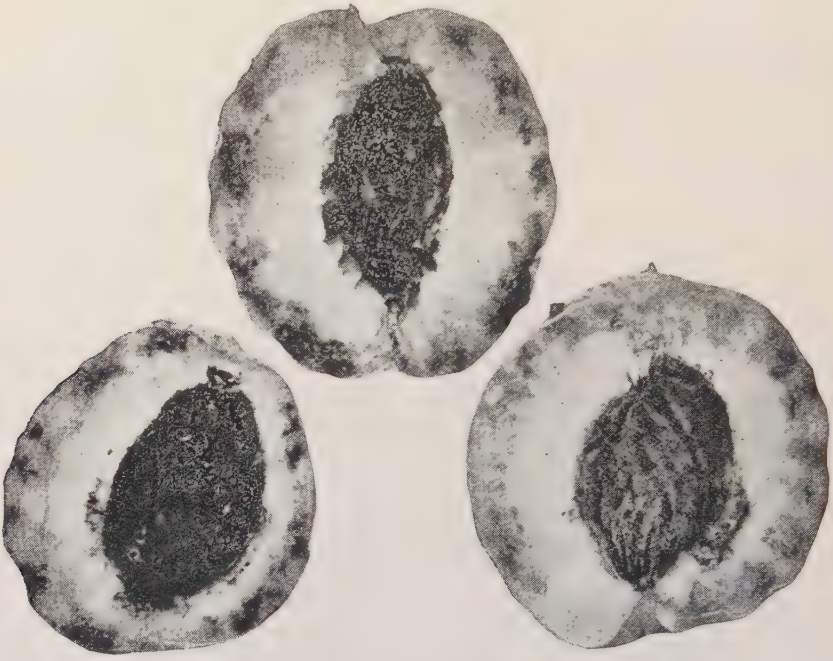
Nature of Injury.—This bug is termed a Haustellate insect, or in common parlance a sap-sucker. The rostrum or beak is inserted into the foliage or fruit, and the liquid juices sucked out. The effect on the foliage is to cause the leaves and young shoots to flag and finally wither up. In the case of fruit the portions which have been punctured appear to die, the unpunctured portions continue to grow, and thus is produced the typical unevenness so common on fruits attacked. This is due to the act of puncturing and sucking resulting in the death of the plant cells.



Peaches showing bugs in the act of sucking and the distorted effect produced. (Whitmarsh.)

Fruit so affected, when cut, clearly shows the dead patches under the skin. Beans are sucked dry and become pale and tough; tomato fruits when attacked exhibit a mottled appearance, and have in the flesh many dry and tough patches. They also rapidly decay and rot. When any fruits are badly punctured they are rendered entirely unsaleable; even if only slightly affected they become second grade. The contents of grapes are sucked, they go dry, and are rendered useless. Rhubarb is made tough and tasteless by this bug.

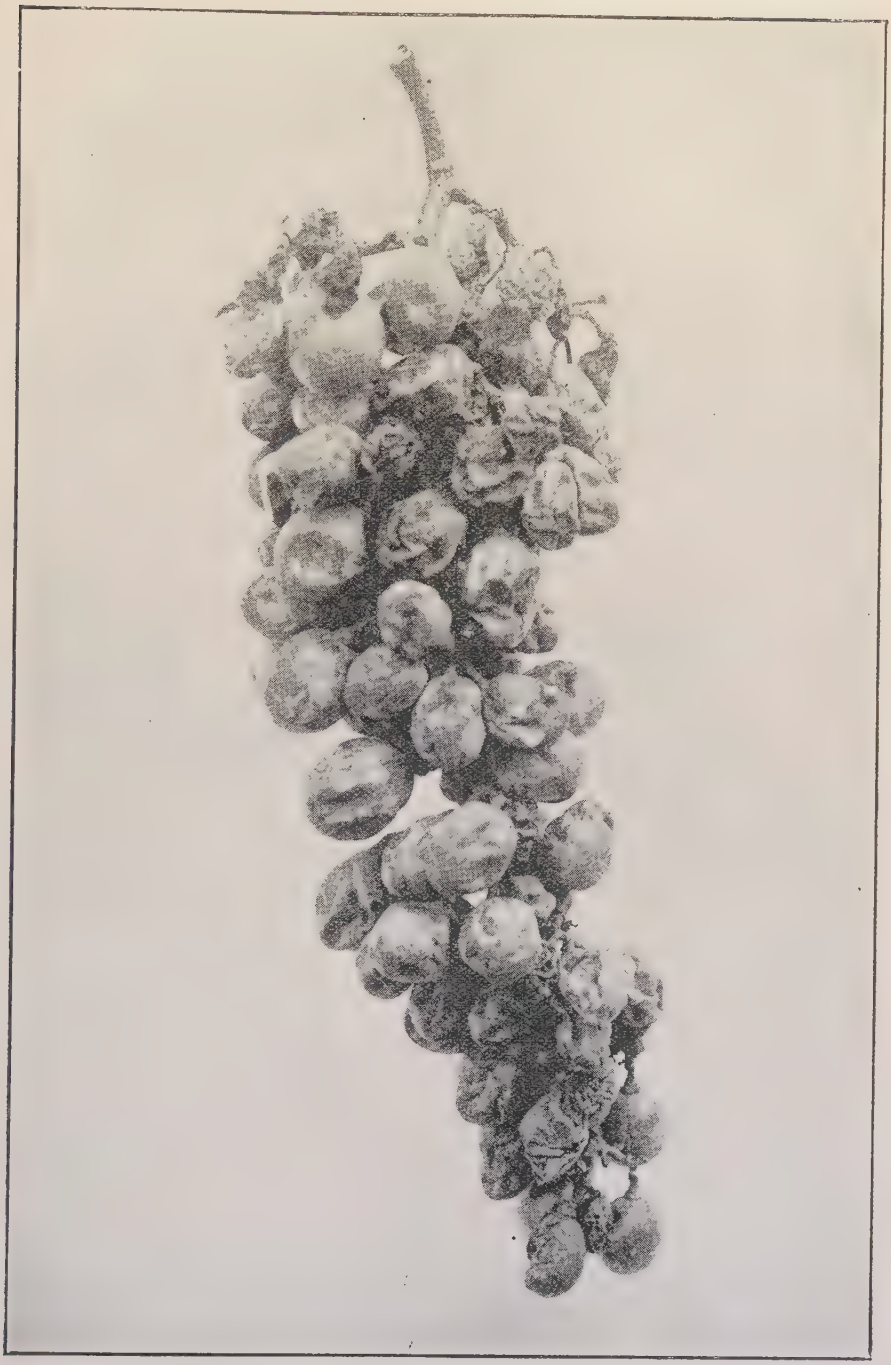
Besides the loss from direct damage done there is the considerable item of financial loss, because of the extra amount of work entailed in sorting out the punctured fruits from the good ones. As these bugs live several months one individual may be responsible for the loss of several bushels of fruit before the completion of its life cycle.



Peaches cut open to show the damage caused by bug to the tissue of the fruit. (Whitmarsh.)

Natural Parasites.—To date in our observations of this pest no natural effective parasites have been observed. Not being a native insect it is comparatively free from enemies, predatory or internal. Like all bugs it gives off a very offensive odour when handled, and hence birds, etc., are not eager to feed upon it.

The only natural control we can depend upon is the climate. On the advent of cold and wet weather the adults and some nymphs crawl away and hide under litter, stones, slabs of wood, or other secluded and protected spots. Here they hibernate throughout the months of June, July, and August to mid September. Should there be a spell of fine bright weather during winter the bugs may venture forth. As a pest, however, this bug is active from mid September or October, according to the season, to the end of April or May. Egg-laying first takes place during the spring months, and it is the progeny of these overwintering bugs that causes the damage to crops in November and onwards.



White Grapes depicting the shrivelling and drying up of fruit when attacked by Green Bug. (Original.)

SUGGESTIONS FOR THE PREVENTION AND CONTROL OF THE BUG.

Clean culture and cleanliness about a farm are two essential points in the suppression of this bug. The tomato bug, as mentioned previously, must have shelter to protect it in winter, hence if all rubbish is removed from a field, garden or orchard there is no place for it to hide. All remains of crops which furnish nourishment, and all weakly or useless plants should be pulled up and burned as soon as they are finished with.

The method of growing crops under crowded conditions must cease. Tomatoes will have to be grown on stakes or trellises instead of the present general system. This is essential to permit of the infested plants being sprayed, and the ground shelter removed. Under the system of non-staking or trellising the tomato plants spread over the area until it is hard to distinguish the rows. Under such conditions it is utterly impossible to get at the bug should the plot become infested. This not only applies to tomatoes, but is applicable to any crops including potatoes. Sufficient room must be left to get the spray pump through the rows, and thus make it possible to bring the spray in contact with the bug.

The bug loves shelter and will always prove more prolific and damaging under unsanitary conditions, and as it is a strong flier one neglectful grower may be the means of supplying a whole district with the pest.

Avoid the use of seedling plants from infested districts as this is a fruitful means of spreading the pest. To raise your own seedlings is an excellent policy to follow out as a means of preventing the introduction of pests and disease to your farm. If a crop is hopelessly damaged by the insect have it removed and destroyed at once. Good results may be obtained in the way of clearing the ground of bugs before planting. This can be done by putting out piles of old rubish in the field where the plants are to be grown. The bugs and other insects will collect in these, and they can then be destroyed by fire.

REMEDIAL MEASURES.

Knowing that the eggs of the bug are usually laid in clusters on the foliage of the plant attacked much good can be accomplished by picking off these egg masses, and destroying them. The habit of the young bugs when first emerging, and up to their first moult, is to live and feed gregariously, so that they will always be found in clusters near the eggs from which they hatched. After the first moult they scatter all over the host plant. Knowing this, every effort must be made to destroy the bugs before they spread and whilst they are very sensitive to a contact spray.

Once the adult winged stage is reached it is a most difficult pest to destroy with a spray. The wings so well shelter the breathing spiracles and act as a waterproof covering that it is almost impossible to deal with them by spraying. If, however, growers would consistently work at the destruction of the pre-winged or nymphal stages, the winged stages would never be reached, and the pest prevented from reproducing. To this end spring treatment is essential to be followed up whenever the pest appears.

The bug is purely a sap sucker. If you examine it, there will be found on the lower side of the head a long-jointed tube carefully folded back between the legs along the lower side of the body. When the insect wishes to feed this tube is brought forward and inserted into the plant tissues, when the juices are sucked up through it. This method of feeding makes it difficult to combat, for the bug is perfectly immune to any stomach poison which may be sprayed on the foliage. It is, therefore, useless to apply such poisons as arsenate of lead, paris green, etc.

The only way the bug can be got at is by means of some contact spray which is forced into the breathing spiracles, which kills either by stuffing up the spiracles, or by forcing the spray through the spiracles into the system, and thus killing by irritation or poisoning.

In an attempt to check this pest many specifics have been tried; some have given negative results and some partial. In all instances it was found most difficult to destroy the adult. The following mixtures have been found effective against the nymphal or prewinged stages.

Benzole Emulsion.—A proprietary preparation used as prescribed on the labels—1lb. to 5 gallons of water.

Green's aphis wash, 1 pint to 3 gallons cold water.

Kerosene Emulsion.—This emulsion or other oil emulsions are useful.

The following home-made mixtures are effective:—Take 1 quart phenyle, 3lbs. washing soda, 1 bar of yellow soap, and 40 gallons of water. Shred the soap and dissolve in boiling water to which the other ingredients are added, and make the mixture up to 40 gallons.

Sunlight soap 8 ozs., turps 8 tablespoonfuls, and water 4 gallons. Dissolve the soap in 2 gallons of boiling water, remove from the fire and add the turps. Stir thoroughly and make up to 4 gallons. Apply whilst hot.

Sunlight soap 16ozs., cresyllic acid ½lb., and water 10 gallons. Dissolve the soap in boiling water, remove from the fire and stir in the cresyllic acid. Make up to 10 gallons with cold water.

In the use of any of these mixtures recommended it is not advisable to apply them to fruit or vegetables within three weeks of picking or cutting for market, as there is likely to be imparted a disagreeable flavour and odour. The effort to control this bug must be made prior to the produce reaching maturity. If kept free up to the period before-mentioned there is little danger to be feared from this pest.

The fact that the bug falls to the ground when disturbed renders it possible, if the crop is grown with sufficient room between the plants, to spray most of the bugs whilst on the ground, thus avoiding the foliage or fruits.

The secret of success in the use of any control spray against this pest is thoroughness of application with a good force, seeing that the bugs are well coated. To merely apply a misty film will be of little avail.

Never apply sprays during the heat of the day; early morning and late afternoon being the most suitable time.

Jarring the infested plants over an inverted umbrella, or if a bag or sheet is spread around, will cause most of the bugs to fall, when they can be gathered up and destroyed.

POULTRY NOTES.

W. T. RICHARDSON,
Poultry Adviser.

Green Feed.

The value of green feed does not receive the thoughtful attention it deserves from the average poultry-keeper. Its functions are barely understood and its feeding and general properties insufficiently appreciated. One of the poultry-keeper's main considerations, whether he keeps a small number of fowls for household purposes in the way of eggs, and an occasional bird for the table, or whether he goes in for poultry as a commercial proposition, should be to make provision for a regular and plentiful supply of green feed all the year round, sufficient for the full requirements of his birds. Fowls can exist without green food or vegetable food of any description, but they will do much better in all respects if a supply of green food forms part of their daily ration: on the other hand fowls will also exist on a diet composed mainly of all green stuff, but results as far as eggs or condition are concerned will be more than disappointing. On this score, however, we need not have much fear as, generally speaking, birds do not get anything near the amount of green feed they should consume to their benefit as well as that of their owners.

It is most essential in keeping the birds—young or old—in good health. Giving them an occasional big feed of green stuff may lead to bowel and crop troubles, as they are liable to gorge themselves.

The breeding pen requires liberal supplies of green fed, without which the hens will get over fat, particularly so the heavy breeds, such as the Orpingtons, Plymouth Rocks, Rhode Island Reds, etc., Such condition though not affecting the fertility to any marked degree will certainly be responsible for poor hatches, in the way of "dead in the shell" and weak constitutioned chicks.

Some breeders give their stock birds a liberal supply of green feed at mid-day. This is the correct procedure if they stopped at that, but unfortunately they go further and give it to them in a moist state, dried up with pollard. The consequent result is poor hatchings.

Growing stock greatly benefit by an abundance of green feed. Bulk is essential for internal development, which will later give the hen the necessary capacity to consume large quantities of food. The egg being produced out of the food digested by the hen, it stands to reason that a heavy layer must necessarily be a big eater. It does not, however, follow that a big eater is a heavy layer, because in some hens, especially those of heavy breeds, a large proportion of food required to produce eggs is turned into fat. There should be no room for such birds in the breeding or laying pens.

Young birds fed liberally on green feed are less subject to attacks of chicken-pox than those fed scantily or totally deprived of it. Laying hens will lay more eggs when green food is given in abundance and their eggs will have that rich dark colour, which denotes "quality." Again, bulk feeding has a great influence in producing large-sized eggs.

Where a liberal allowance of green food enters into the daily ration, the feeding costs will be materially reduced, a factor of vital importance at the present prices of grain and mill offal.

Lucerne, Berseem and other clovers are undoubtedly the best of green foods. The former takes pride of place, as, once established, it can be cut all the year round, particularly so in the summer months, and a stand of lucerne will last for a number of years, provided proper attention is given it in the way of cultivation, fertilisers, and a plentiful supply of water. The nutritive value of clovers is higher than that of other green foods.

Cape-weed is greatly relished by poultry. Rape, green maize, lettuce, cabbage, green barley, and silver beet are all very suitable providing they are fresh, clean, and sound, and fed in conjunction with lucerne they afford variety and increase palatibility. Lawn clippings may also be fed to poultry when other green stuff is not available.

In the absence of green feed, lucerne chaff makes a good substitute for adult birds. It should, however, be steeped overnight in boiling water for use next morning in the mash. Of course it can never take the place of fresh green foods.

The amount of greens to be given young stock will depend on their age. From the second week add finely-cut succulent stuff to their mash, by preference lettuce, barley, oats, and gradually increase the quantity until 12 weeks old, when they should be fed same as for adults. The latter should have not less than 40 per cent. of it in their mash in winter, and 50 per cent. in summer—bulk measurement.

If in the middle of the day and after their grain ration in the evening, the birds are given as much of it as they will eat, better results will be recorded. The finer the cut the shorter the fibre, which adds to its digestibility and lessens crop troubles.

SHEEP BREEDING—A NATIONAL INDUSTRY.

Hugh McCallum,
Sheep and Wool Inspector.

One of the most important subjects to the farmers of Western Australia is that of stock breeding. In our present stage we are a community of primary producers. The chief concern should be the maintaining of our flocks at a high standard of excellence. The breeding of animals of strong constitutions is necessary to successful farming; with keen rivals to face and with the cost of production generally high it is imperative that the quality of wool and mutton production must be maintained if success is to attend our operations. In the important work of sheep-breeding we have many difficulties to overcome. The successful breeding of sheep is not a business that can be learnt from the best work ever written. It requires practical experience over many years. In this young community of primary production many of our young farmers have not graduated on the land, but have taken up sheep and mixed farming as novices, therefore it would be surprising were all the men, breeding sheep in the State, capable of producing the best types of animals, or of observing the elementary rules necessary to the maintenance of good type and constitution. Education is necessary if a general appreciation of the importance of observing the accepted principles in breeding is to be secured.

The Government (past and present) is to be congratulated on the Narrogin School of Agriculture, also the Muresk Agricultural College shortly to be opened to impart knowledge to the young mind on all things appertaining to primary production.

In connection with the method of judging sheep at our agricultural shows, much education can be imparted to the man on the land. If the farmers are to gain any information regarding the different awards, the reason for the awards should be plainly stated so that they may understand and thus secure some benefit from the competitions, otherwise the exhibits act only to merely interest competing breeders. Students judging competitions should also be encouraged more by the agricultural societies. This should have a definite effect of prominently bringing before our sheep-farmers a sound knowledge of the ideals to be aimed at in breeding. It should be apparent to any one who has studied the subject and travelled over the mixed farming areas under cultivation that it is easily capable under more intensive and thorough cultivation of carrying at least 50 per cent. more sheep. Take the millions of acres of land now in the stage of development in the East Murchison and the unoccupied lands awaiting development: much of this will become ideal sheep country. It is no optimistic prediction to assert that this State is easily capable of carrying millions of sheep more than at present.

The success of the sheep industry in this State is due to several leading factors. The soil and climate are eminently suitable for sheep-breeding. The splendid foundation laid by our pioneers must not be over-looked. They imported the best sheep possible. They thoroughly understood the business that demands experience combined with keen powers of observation and a natural intuition for it—that inherited love for live stock, and skill in breeding same.

Flocks a credit to Western Australia.

At no previous time have the leading stud flocks of the State attained a higher standard of excellence than obtains at the present time. A visit to the stud farms throughout the State and the agricultural shows will satisfy the most critical judge that the stud-breeders know their business, and to further realise the energy of the stud sheep breeders in maintaining the high standard of their stock. One has only to observe the continuous importations into the State of the very best sheep from the best studs of Eastern Australia. The Merino Stud Breeders Association of Western Australia also is doing excellent work, and is capable of wider expansion as time goes on. Suffice it to say that our stud sheep which are the foundation of the flocks are of the highest standard quality. Therefore with ordinary care regarding feeding and culling there is no reason to expect other than a steady improvement in the quality of our flocks.

The importance and extent of the pastoral industry and what its progress or decadence means, not only to those directly interested but to the community generally, might be pointed out that in wool alone an increase of production of 1lb. of wool per sheep, to which may be added as a sequence of the improved productive power a corresponding improvement in quality. What would such increase mean to the credit of the sheep farmers? On the other hand, what would a decadence mean to the producers? These are thoughts for earnest consideration.

Assuming that deterioration may take place in our flocks through neglect, the points of weakness to be detected and rectified must be considered. What may be expected as the outstanding symptoms. Hereditary traces of many breeds, absence of uniformity both in size, character and type, shrinkage in our wool production, and much of this showing almost every conceivable grade from fine wool to coarse hair. In the majority of cases where deterioration in a flock has taken place, it can be found that the indiscriminate selection of rams has been the cause of the set-back, and there is little doubt about the inferior rams used. How noticeable it is that some flock owners will not pay a reasonable price for a suitable ram, preferring to buy an inferior animal of almost any breed or breeds because of cheapness. In such cases, if deterioration is to be avoided owners of small flocks would do well to change their methods and to carefully watch their flocks. The intelligent feeding of sheep is a most important factor. It is a fact, nevertheless, that no matter how well fed, unless sheep are bred on proper lines the final result must be retrogression. Purity of blood counts for everything good in stock. How few people realise this.

The fact that the ram is the dominating factor in deciding the destiny of the flock suggests to those just entering upon pastoral or mixed farming pursuits, or to some who may have fallen victims to the results of indiscriminate mating, the importance of the question how to select a ram again in this issue may not be out of place.

The ram should be pure bred and true to type with a strong bold carriage, of a decidedly masculine character, showing marked individuality and uniformity; large frame, without a tendency to be undersized, well set on his legs indicating strength, well ribbed up, with deep full quarters and well-developed thighs both inside and out. The head should be decidedly mascu-

line, being full of character and should be carried on a powerful neck, well set into the shoulder. A weak neck should never be tolerated. The eyes should be bright and reasonably prominent, with nothing sluggish in their appearance; in short, he should be a ram; not like some of the ill-bred animals sold as rams a few years ago. The wool should show density of fibre, good length of staple, and be of uniform quality all over the body as can reasonably be expected, with as little tendency to coarseness about the thighs as possible. Every ram should be carefully examined before purchase for the presence of hair on any part of the body, and promptly rejected if showing signs of kemp.

How to commence and continue.

After noting the quality and condition of the land upon which the sheep are to be pastured, and after carefully observing its aspect and natural and climatic conditions, the intending sheep-farmer, to be successful, should decide definitely which breed of sheep will best suit the country, at the same time firmly fixing upon a type, and should also determine never to forget the one essential to success, namely, *don't overstock*. Our losses from overstocking in many parts of the State are too heavy; also remember to frequently change, where possible, the sheep from one paddock to another. A permanent supply of good water is essential. Careful observance of these details will largely prevent parasitic ailments and ensure a healthy flock with a minimum death rate. Important as these points are, however, it is on breeding and judicious feeding that the main success of the sheep-farmer must depend. Having sheep suitable to their environment, culling heavily to maintain type and constitution, and managing them to advantage, the farmer will within a few years find himself in possession of a flock to be proud of, and one which will redound both to his own credit and to that of the industry in Western Australia.

FIELD EXPERIMENTS WITH WHEAT AT THE MERREDIN EXPERIMENT FARM.

I. Thomas, Superintendent Wheat Farms, and

J. H. Langfield, Manager Merredin Experiment Farm.

The past season was abnormal in so far as the rainfall was concerned. The useful rainfall—May to October—totalled 554 points, which is 313 points below the average and only half of the amount recorded for the previous year, and is the lightest rainfall since 1914, when only 372 points were registered for the same period.

The rainfall for 1924 and 1925, together with the average rainfall for the past 14 years, is as hereunder:—

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Yearly Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
1925 ...	235	136	43	27	104	147	134	18	98	53	544	5	26	1,026
1924 ...	...	27	68	48	215	227	102	189	139	208	1,080	46	3	1,272
Average 14 years ...	68	62	83	80	135	184	192	146	99	90	847	40	64	1,243

The land on which the experiments were grown was heavy forest. It was prepared by being ploughed four inches deep with a disc plough during June, 1924, and in September cultivated with a Springtyne implement, again in March. Disc cultivated in April and harrowed after seeding.

LATE SEEDING EXPERIMENT.

Previous to this year all the plots of this experiment were harvested for grain. This year additional plots were planted to enable hay results to be also obtained. Each section was repeated eight times, five being harvested for grain and three for hay.

To meet the requirements of the experiment the different plantings took place during the middle of the months of May, June, and July. All plots received the same treatment until the May plots were planted, when all the plots of the experiments were cultivated. Further to this the June and July plots were cultivated at the time the June section was planted, and the July section being again cultivated prior to its being seeded.

The results for this year, together with the averages for the past three years the experiments have been conducted, are hereunder:—

LATE SEEDING EXPERIMENT.

HAY RESULTS.

Variety, "*Gluyas Early*." *Seed*, 45*lbs*. *Superphosphate* 22%—90lbs.

Date of Planting.	Computed Yields per acre.			Average, 1925.	Percentage, 1925.
	Section 1.	Section 2.	Section 3.		
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	
15th June	13 0 8	15 0 16	13 0 8	13 3 1	60
15th May	20 1 12	25 0 0	23 0 6	22 3 6	100
15th July	10 2 8	11 0 8	10 0 24	10 2 13	47

Grain Results.

Date of Planting.	Computed Yields per Acre.										Average, 1925.		Percentage 1925.	Percentage 1923-1925
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
15th June ...	17	4	16	40	16	40	16	24	16	24	16	38	96	87
15th May ...	16	56	16	40	18	48	17	4	17	4	17	18	100	100
15th July ...	10	16	10	40	10	24	10	40	10	0	10	24	60	56

The average results for the past three years of the grain, and this year's results of the hay, are in favour of the May planting. This is the general adopted practice and can be continued with confidence.

RATE OF SUPERPHOSPHATE.

This experiment was commenced at this farm in 1923, and has since been continued each year.

The results for last year, together with the average results since 1923, are hereunder:—

RATE OF SUPERPHOSPHATE EXPERIMENT.
Hay Results.

Variety, "Gluyas Early." *Planted 18th May.*

Rate of superphosphate per Acre.	Computed Yields per Acre.									Average yields, 1925.		Percentage yields, 1925.	Percentage yields, 1923–1925.
	Section 1.			Section 2.			Section 3.						
	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs. lbs.		
150 lbs.	25	2	24	28	2	24	31	3	4	28	2 27	115	115
75 lbs.	23	2	0	25	1	4	26	0	16	24	3 25	100	100
225 lbs.	31	0	0	34	3	20	33	2	8	33	0 19	133	121

Grain Results.

Rate of superphosphate per Acre.	Computed Yields per Acre.										Average yields, 1925.		Percentage yields, 1925.	Percentage yields, 1923–25.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
150 lbs. ...	18	16	19	44	18	48	18	32	19	4	18	53	111	110
75 lbs. ...	16	56	17	28	16	56	17	4	16	48	17	2	100	100
225 lbs. ...	21	28	20	40	19	12	20	16	20	24	20	24	120	116

The usually accepted theory that the heavier applications of superphosphate are detrimental to the wheat crop in a dry season is not confirmed by these results, but rather the reverse. It was noticed throughout the growing period that the heavily dressed plots showed up to advantage although the rainfall for this period was 303 points below the average, and the lowest since 1924.

RATE OF SEEDING EXPERIMENT.

This experiment has been carried out continuously for the past 11 years, with two varieties—a very early and sparse stooling variety and a midseason and free stooling variety.

The result of last year's trials, together with the results of previous years, is set out in the table hereunder. A fair percentage of the seed malted on all plots, which may have been to the advantage of the heavier sowing.

RATE OF SEEDING EXPERIMENT.

Superphosphate 22%—90lbs. per acre.

HAY RESULTS.

Midseason variety, "Nabawa." *Planted 14th April.*

Rate of Seed per Acre.	Computed Yield per Acre. Section 1.	Section 2.	Section 3.	Average Yields, 1925.	Percentage Yields, 1925.	Percentage Yields, 11 years.
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.		
30 lbs	14 1 4	14 2 16	...	14 1 24	93	94
45 ,,	16 0 0	15 0 8	...	15 2 4	100	100
60 ,,	13 0 8	15 1 20	...	14 1 0	92	92

Early variety, "Florence." *Planted 29th May.*

Rate of Seed per Acre.	Computed Yield per Acre. Section 1.	Section 2.	Section 3.	Average Yields, 1925.	Percentage Yields, 1925.	Percentage Yields, 11 years.
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.		
30 lbs.	13 0 16	10 2 24	13 3 20	12 2 10	92	96
45 ,,	13 2 8	13 2 0	13 3 4	13 2 13	100	100
60 ,,	12 3 4	13 3 4	13 0 16	13 0 27	97	95

GRAIN RESULTS.

Midseason variety, "Nabawa."

Rate of Seed per Acre.	Computed Yields per Acre. Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Average, 1925.	Percentage 1925.	Percentage 11 years.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.		
30 lbs.	14 0	16 8	15 36	12 24	11 12	13 52	93	95
45 ,,	16 32	16 32	16 48	11 52	13 4	14 57	100	100
60 ,,	17 36	15 20	16 24	11 12	13 44	14 51	99	99

Early variety, "Florence."

Rate of Seed per Acre.	Computed Yields per Acre. Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Average, 1925.	Percentage 1925.	Percentage 11 years.
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.		
30 lbs.	7 44	7 52	6 56	8 56	8 24	7 58	98	98
45 ,,	7 28	7 12	7 36	9 20	8 48	8 5	100	100
60 ,,	7 28	6 16	8 0	8 56	8 8	7 46	95	98

The conclusion that can be drawn from both this year's results and the average for the 11 years the trials have been carried out is that no advantage is gained by increasing the rate of seeding over 45lbs. per acre with graded seed.

MERREDIN EXPERIMENT FARM.
SEASONABLE PLANTING EXPERIMENT.

APRIL PLANTING.

Planted 9th April. *Seed, 45lbs.* *Superphosphate, 22%—90lbs.*

HAY YIELDS.

Date of Planting.	Variety.	Computed Yield per Acre. Section 1.	Section 2.	Section 3.	Average Yield, 1925.	Percentage Yield, 1925.
		cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	
May 14 ...	Gluyas Early (control)	26 3 4	27 1 4	27 0 8	27 0 5	100
April 9	Yandilla King ...	17 0 0	16 0 24	16 1 20	16 2 5	61
	Nabawa	17 0 24	18 2 0	17 2 8	17 3 1	65
	Gluyas Early ...	14 3 12	17 3 4	23 2 16	18 3 1	69
	Florence	18 0 0	17 0 0	18 1 12	17 3 4	65
May 14 ...	Gluyas Early (control)	27 1 4	27 0 8	28 1 12	27 2 8	100

GRAIN YIELDS.

Date of Planting.	Variety.	Computed Yield per Acre. Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Average Yield, 1925.	Percentage Yield, 1925.	Percentage 1924–25.
1925.		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.		
May 14 ...	Gluyas Early (control)	18 16	18 48	19 36	18 32	18 0	18 38	100	100
April 9	Yandilla King	13 44	14 40	16 16	12 56	13 36	14 14	77	...
	Nabawa ...	16 16	17 12	16 56	14 56	15 52	16 14	88	101
	Gluyas Early	16 48	17 36	17 4	15 36	15 20	16 29	90	85
	Florence ...	7 20	9 12	8 48	8 8	8 16	8 21	46	55
May 14 ...	Gluyas Early (control)	18 48	19 36	18 32	18 0	16 40	18 19	100	100

MERREDIN EXPERIMENT FARM.
SEASONABLE PLANTING EXPERIMENT.

MAY PLANTING.

Planted 14th May. *Seed 45lbs.* *Superphosphate 22%—90lbs.*

HAY YIELDS.

Date of Planting.	Variety.	Computed Yield per Acre. Sec. 1.	Sec. 2.	Sec. 3.	Average Yield 1925.	Percentage yield, 1925.	Percentage 1924–1925.
		cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.		
May 14 ...	Gluyas Early (control)	27 0 8	13 0 0	20 1 4	20 0 13	100	100
Do. ...	Yandilla King	19 2 16	8 0 0	13 2 8	13 2 27	66	...
Do. ...	Nabawa ...	25 0 8	12 1 20	19 3 4	19 0 11	86	86
Do. ...	Merredin ...	11 1 4	15 2 16	20 1 4	15 2 27	82	87
Do. ...	Florence ...	10 3 20	12 2 24	16 2 16	13 1 20	77	85
Do. ...	Gluyas Early (control)	14 0 16	15 3 4	21 0 16	17 0 3	100	100

GRAIN YIELDS.

Date of Planting.	Variety.	Computed Yield per Acre. Sec. 1.	Sec. 2.	Sec. 3.	Sec. 4.	Sec. 5.	Average Yield, 1925.	Percentage Yield, 1925.	Percentage 1924–25.
1925.		bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.		
May 14 ...	Gluyas Early (control)	18 0	7 20	14 56	14 24	17 4	14 21	100	100
Do. ...	Yandilla King	18 40	8 32	14 0	16 24	16 40	14 51	102	...
Do. ...	Nabawa ...	22 8	11 44	16 56	20 24	17 20	17 42	116	108
Do. ...	Merredin ...	18 16	12 8	16 40	16 32	8 48	14 29	86	92
Do. ...	Florence ...	10 32	8 0	9 28	9 12	7 52	9 1	56	68
Do. ...	Gluyas Early (control)	18 40	14 32	15 52	15 28	15 28	16 0	100	100

NOTE.—The results of the May planting have been extracted from the Variety trials.

MERREDIN EXPERIMENT FARM.

SEASONABLE PLANTING EXPERIMENT.

JUNE PLANTING.

Planted 15th *June.* *Seed* 45lbs. *Superphosphate* 22 %—90lbs.

HAY YIELDS.

Date of Planting.	Variety.	Computed Yield per Acre.									Average Yield, 1925.			Percentage Yield, 1925.
		Section 1.			Section 2.			Section 3.						
		cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs	lbs.	
May 14 ...	Gluyas Early (control)	16	2	0	18	2	16	21	0	8	18	2	27	100
June 15	Yandilla King ...	8	3	20	10	0	24	11	0	24	10	0	13	53
	Nabawa	9	3	20	11	1	20	12	2	0	11	1	4	57
	Gluyas Early ...	14	0	0	14	3	4	17	2	24	15	2	0	77
	Florence	11	0	8	11	0	24	14	0	24	12	0	19	58
May 14 ...	Gluyas Early (control)	18	2	16	21	0	8	24	0	8	21	1	1	100

GRAIN YIELDS.

Date of Planting.	Variety.	Computed Yield per Acre.										Average Yield, 1925.		Percentage Yield, 1925.	Percentage 1924–25.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
1925.		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
May 14 ...	Gluyas Early (control)	13	4	12	24	9	4	10	16	12	56	11	33	100	100
June 15	Yandilla King	9	20	7	44	6	48	8	32	10	8	8	30	74	92
	Nabawa ...	13	4	10	32	9	52	11	44	13	28	11	44	101	105
	Gluyas Early	14	16	11	12	11	4	14	0	16	0	13	18	115	106
	Florence ...	8	40	6	0	6	40	8	0	9	28	7	46	66	58
May 14 ...	Gluyas Early (control)	12	24	9	4	10	16	12	56	13	52	11	42	100	100

MERREDIN EXPERIMENT FARM.

SEASONABLE PLANTING EXPERIMENT.

PERCENTAGE RESULTS, 1924–25.

HAY YIELD.

Varieties.	April.		May.		June.	
	1925.	1924–25.	1925.	1924–25.	1925	1924–25.
Gluyas Early	69	...	100	100	77	...
Nabawa	65	...	86	86	57	...
Florence	65	...	77	85	58	...
Yandilla King	61	...	66	...	53	...
Merredin	...	...	82	87	...	...

Note.—No Hay Yields for previous year in April and June.

GRAIN YIELDS.

Varieties.	April.		May.		June.	
	1925.	1924–25.	1925.	1924–25.	1925.	1924–25.
Gluyas Early	90	85	100	100	115	106
Nabawa	88	101	116	103	101	105
Yandilla King	77	...	102	...	74	92
Florence	46	55	56	68	66	58
Merredin	...	...	86	92	...	...

FIELD EXPERIMENTS WITH WHEAT AT THE CHAPMAN EXPERIMENT FARM.

I. Thomas, Superintendent Wheat Farms, and

P. Jeffery, Manager Chapman Experiment Farm.

The rainfall for the year under review, together with the averages for the past twenty years, is as hereunder:—

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total growing period	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
1925 ...	35	25	102	2	250	748	324	106	242	82	1,752	26	84	2,026
Average, 20 yrs.	30	55	48	38	225	411	389	272	165	96	1,558	21	20	1,770

The total for the year will be seen to be 256 points in excess of the average, whilst that for the growing period—May to October—was 194 points in excess. This was more than accounted for in June, when 748 points were registered; the average for that month being 411 points. This excess was not beneficial, but rather the reverse, as the land became somewhat waterlogged, and later hard and crusted.

All the experiments were planted on fallowed land, which had been prepared by ploughing four inches deep during June and July of the previous year with a mouldboard plough, and subsequently cultivated when needed to suit the requirements of the experiments or to destroy weeds and conserve moisture. All plots were cultivated prior to seeding. Sheep were also pastured on the fallow to assist in destroying weeds and consolidate the under surface.

The lands on which the experiments were carried out had been cleared mainly of jam trees with a little wattle and scrub, except the ploughing and mulching experiments when, in addition to jam trees, York gum trees were also cleared.

All the plots were repeated eight times with the exception of those in the ploughing experiment. Five were harvested for grain and three for hay. All seed planted was treated with copper carbonate for the prevention of ball bunt.

The results of the different experiments for this year, together with the average percentage results of previous years, are set out in the tables hereunder:—

RATE OF SEEDING EXPERIMENT, 1925.

Two varieties were used in this experiment, *i.e.*, "Florence," a very early and sparse stooling variety, and "Yandilla King," a late and free stooling variety.

HAY YIELDS.

Superphosphate 22%—150lbs. per acre.

Late Variety, "Yandilla King." *Planted 1st May, 1925.*

Rate of seeding per acre.	Computed Yields per acre.									Average, 1925.			Percentage, 1925.	Percentage, 1923–1925.
	Section 1.			Section 2.			Section 3.							
	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.		
60lbs.	27	2	24	33	0	0	28	0	8	29	2	11	88	91
45lbs.	36	0	24	36	0	8	28	0	16	33	1	25	100	100
90 lbs.	41	0	0	34	1	12	29	2	0	34	3	22	104	99
Early Variety, "Florence."													*Planted 1st May, 1925.*	
60 lbs.	35	3	20	37	0	0	29	0	24	34	0	6	103	101
45 lbs.	31	0	24	34	0	8	34	0	24	33	0	19	100	100
90 lbs.	35	1	20	34	0	24	37	1	12	35	2	18	108	113

GRAIN YIELDS.

Late Variety, "Yandilla King." *Planted 1st May, 1925.*

Rate of seeding per acre.	Computed Yield per acre.										Average 1925.		Percentage 1925.	Percentage 1923–1925.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
60lbs. ...	28	8	28	24	20	16	26	16	25	52	25	44	91	96
45lbs. ...	31	20	28	8	28	16	26	24	26	24	28	6	100	100
90lbs. ...	33	12	28	24	30	16	31	12	26	0	29	49	106	100

Early Variety, "Florence." *Planted 1st May, 1925.*

Rate of seeding per acre.	Computed Yield per acre.										Average 1925.		Percentage 1925.	Percentage 1923–1925.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.					
	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
60 lbs. ...	20	24	22	0	22	32	20	0	25	36	22	6	101	104
45 lbs. ...	21	4	22	16	20	40	21	28	24	24	21	58	100	100
90 lbs. ...	23	44	24	56	23	44	26	0	27	4	25	5	114	110

The results of three years' experience on this class of soil indicate that with a free stooling variety there is no advantage in using more than 45lbs. of seed either for hay or grain. With the sparse stooling variety for hay purposes, however, heavy seeding is desirable.

RATE OF SUPERPHOSPHATE.

This is the third year in which these trials have been conducted. The table hereunder shows the results for this year, together with the average for three years.

RATE OF SUPERPHOSPHATE EXPERIMENT, 1925.

Variety, "*Nabawa.*" *Planted 29th April,* 1925.

HAY YIELDS.

Rate of superphosphate per acre.	Computed Yields per acre.			Average 1925.	Percentage 1925.	Average Percentage 1923–1925.
	Section 1.	Section 2.	Section 3.			
	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.	cwt. qrs. lbs.		
150 lbs.	31 3 12	26 1 4	35 2 24	31 1 4	112	113
75 lbs.	21 2 0	25 1 12	37 0 16	28 0 0	100	100
225 lbs.	29 1 4	34 1 20	*	31 3 12	114	112

* Owing to an accident with the drill, the seed was not planted regularly on this plot. The yields were therefore not taken.

Rate of Superphosphate Trial, Chapman Experiment Farm, 1925.

GRAIN YIELDS.

Rate of superphosphate per acre.	Computed Yield per acre.					Average 1925.	Percentage 1925.	Average percentage, 1923.
	Section 1.	Section 2.	Section 3.	Section 4.	Section 5.			
	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.	bus. lbs.			
150 lbs. ...	18 24	19 44	13 4	16 56	21 28	17 54	113	110
75 lbs.	17 28	17 44	12 32	14 40	16 48	15 50	100	100
225 lbs. ...	20 40	*	16 32	22 0	21 36	20 12	128	115

* Owing to a salt patch at the end of this plot, the seed did not germinate. The yields of this plot were, therefore, not taken.

This year's results continue to indicate that the yields for both hay and grain are increased by the larger amounts of superphosphate.

THE SEASONABLE PLANTING EXPERIMENT.

The seed in the April section of the experiment was planted on an apparently dry seed bed, but owing to the excellent condition of the fallow

the seed germinated immediately. Two points of rain were registered on the 27th, followed by a timely fall of 24 points on the 6th May.

Four varieties were used, *i.e.*,, "Yandilla King" (late), "Nabawa" (mid-season), "Gluyas Early" (early), and "Florence" (very early). "Gluyas Early," planted in May, was used as a control.

The results of the different plantings for the year, together with the percentage results for 1924, are shown in the tables hereunder:—

CHAPMAN EXPERIMENTAL FARM.
SEASONABLE PLANTING EXPERIMENT.
APRIL PLANTING.

Planted 15th April. *Seed 45lbs.* *Superphosphate 22%—90lbs.*

HAY YIELDS.

Date of Planting.	Variety.	Computed Yield per acre.									Average yield 1925. 1925.			Percentage yield, 1925.	Percentage 1924–1925.
		Section 1.			Section 2.			Section 3.							
		cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.		
May 13th	Gluyas Early (control)	25	2	8	25	0	0	29	3	12	26	3	7	100	100
April 15th	Yandilla King	18	2	0	16	3	4	15	0	8	16	3	9	61	60
	Nabawa ...	18	3	20	19	1	20	18	2	24	19	0	3	68	87
	Gluyas Early	24	3	12	24	0	8	22	0	16	23	2	21	82	91
	Florence ...	19	2	24	20	2	8	19	1	4	19	3	12	67	80
May 13th	Gluyas Early (control)	29	3	4	27	0	0	33	3	4	30	0	21	100	100

GRAIN YIELDS.

Date of Planting.	Variety.	Computed yield per acre.										Average yield, 1925.		Percentage yield 1925.	Percentage 1924–1925.
		Sec 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
May 13th ...	Gluyas Early (control)	24	16	21	44	21	52	22	40	21	20	22	22	100	100
April 15th	Yandilla King	18	0	17	36	18	8	18	24	17	44	17	58	82	70
	Nabawa ...	18	40	18	16	18	32	18	56	18	40	18	37	87	93
	Gluyas Early...	18	32	14	16	19	4	18	0	18	56	17	46	84	85
	Florence ...	16	24	16	32	16	56	16	32	15	36	16	24	80	76
May 13th	Gluyas Early (control)	19	28	19	52	21	52	20	32	19	44	20	8	100	100

CHAPMAN EXPERIMENT FARM.
SEASONABLE PLANTING EXPERIMENT.
MAY PLANTING.

Planted 13th May. *Seed, 45lbs.* *Superphosphate,* 22%—80/90lbs.

HAY YIELDS.

Date of Planting.	Variety.	Computed yields per acre.									Average yield, 1925.			Percentage yield, 1925.	Percentage 1924–1925.
		Section 1.			Section 2.			Section 3.							
		cwt	qrs.	lbs.	cwt	qrs.	lbs.	cwt.	qrs.	lbs.	cwt	qrs.	lbs.		
May 13th	Gluyas Early (control)	27	0	24	28	2	16	24	3	12	26	3	17	100	100
May 13th	Yandilla King	22	1	12	22	1	12	21	0	24	21	3	25	81	67
May 13th	Nabawa ...	30	0	24	23	0	16	21	3	12	25	0	8	92	73
May 13th	Florence ...	23	0	24	25	1	4	22	3	12	23	3	4	86	88
May 13th	Gluyas Early (control)	24	3	12	28	3	12	30	0	0	27	3	17	100	100

GRAIN YIELDS.

Planting.	Variety.	Computed yield per acre.										Average yield, 1925.		Percentage yield, 1925.	Percentage 1924-1925.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
May 13th ...	Gluyas Early (control)	21	28	21	4	21	28	22	8	21	52	21	36	100	100
May 13th ...	Yandilla King	16	56	16	40	18	0	18	40	17	52	17	38	82	84
May 13th ...	Nabawa ...	20	24	19	44	20	0	20	32	18	56	19	55	92	99
May 13th ...	Florence ...	16	48	17	52	18	24	18	16	17	52	17	50	82	80
May 13th ...	Gluyas Early (control)	20	48	23	44	22	0	21	28	21	4	21	49	100	100

CHAPMAN EXPERIMENT FARM.

SEASONABLE PLANTING EXPERIMENT.

June Planting.

Planted 16th June. *Seed, 45lbs.* *Superphosphate, 22%—80–90lbs.*

HAY YIELDS.

Date of Planting.	Variety.	Computed yield per acre.									Average yield, 1925.			Percentage Yield, 1925.	Percentage 1924–1925.
		Section 1.			Section 2.			Section 3.							
		cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.		
May 19 ...	Gluyas Early (control)	23	1	20	26	2	0	24	2	8	24	3	9	100	100
June 16	Yandilla King	10	2	0	12	2	24	11	1	12	11	2	3	44	50
June 16	Nabawa ...	15	0	0	15	1	20	14	2	8	15	0	0	53	51
June 16	Gluyas Early	20	0	16	19	0	0	18	1	12	19	0	19	65	62
June 16	Florence ...	20	2	0	20	3	12	18	1	4	19	3	15	64	52
May 19 ...	Gluyas Early (control)	36	0	24	31	0	16	31	1	4	32	3	15	100	100

GRAIN YIELDS.

Date of Planting.	Variety.	Computed yield per acre.										Average yield, 1925.		Percentage yield 1925.	Percentage 1924-1925.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.					
		bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.		
May 19 ...	Gluyas Early (control)	16	0	21	4	21	20	19	52	19	44	19	36	100	100
June 16	Yandilla King	12	24	13	20	14	24	13	20	15	12	13	44	70	87
June 16	Nabawa ...	17	52	16	48	17	20	16	8	17	44	17	10	86	93
June 16	Gluyas Early	17	4	17	4	16	24	17	44	17	20	17	7	85	95
June 16	Florence ...	17	4	14	16	14	40	16	32	16	8	15	44	78	76
May 19...	Gluyas Early (control)	21	4	21	20	19	52	19	44	19	44	20	21	100	100

CHAPMAN EXPERIMENT FARM.

SEASONABLE PLANTING EXPERIMENTS.

Percentage Results, 1924–1925.

HAY YIELD.

Varieties.	April.		May.		June.	
	1925.	1924–25.	1925.	1924–25.	1925.	1924–25.
Gluyas Early	82	91	100	100	65	62
Nabawa	68	87	92	73	53	51
Florence	67	80	86	88	64	52
Yandilla King	61	60	81	67	44	50

GRAIN YIELD.

Varieties.	April.		May.		June.	
	1925.	1924–25.	1925.	1924–25.	1925.	1924–25.
Gluyas Early	84	85	100	100	85	95
Nabawa	87	93	92	99	86	93
Florence	80	76	82	80	78	76
Yandilla King	82	70	82	84	70	87

FIELD EXPERIMENTS WITH WHEAT AT THE LIGHT LANDS FARM, WONGAN HILLS.

I. THOMAS, Superintendent Wheat Farms;
M. CULLITY, B.Sc.Ag., Agricultural Adviser.

The experiments carried out during the past year at this farm were Rates of Superphosphate, Rate of Seeding, and a Seasonable Planting Experiment.

The land for these experiments was cleared of scrub during the latter months of 1924 by rolling and burning. It was ploughed five inches deep during the following winter with a disc implement, and was cleared of roots and other rubbish before being disc cultivated prior to planting in May.

With the exception of the plots in the June section of the seasonable planting experiment, all the plots were planted during the second week in May. The planting of the June section of the seasonable planting was, owing to the requirements of the experiment, delayed until a month later, and these plots, in addition to being cultivated with a disc implement in May when the control plots were planted, were again cultivated with a Springtyne cultivator before being planted.

The plots of each experiment were repeated five times—all of which were harvested for grain.

Seasonable Planting Experiment, Wongan Hills.

The rainfall, as recorded at Wongan Hills for 1925 and the average rainfall for the past 12 years, are as shown in table hereunder:—

Year.	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total May-Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
1925 ...	118	100	43	6	181	302	277	33	226	56	1,075	76	24	1,392
Average, over 12 yrs.	47	54	88	68	205	310	259	223	134	95	1,226	36	60	1,579

It will be seen that the rainfall for the growing period of last year was 151 points below the average. This, if distributed better over the period would not have been very noticeable, but as was the case, the August rainfall was within 10 points of being two inches below the average for that month, whilst the following month was almost an inch above the average. This latter, no doubt, redeemed the position, and was more or less responsible for good yields being obtained after such a dry spell.

The detailed results of the different experiments are set out in the tables hereunder:

Rate of Seeding Experiment.—The land on which this experiment was situated was chiefly of the tussock type of sandplain, *i.e.*, surface sand overlying gravelly cement subsoil at from 9 inches to 18 inches.

Two varieties were planted:—S.H.J., a very early and sparse stooling variety, and Nabawa, a midseason and freer stooling variety.

Until August, when the dry spell occurred, no difference could be noticed between the plots except that the control plot of 45lbs. per acre appeared to make healthier growth. At the end of August the heavier seeded plots were inclined to lose their green colour, no doubt due to the lack of rain. However, with the fall of rain early in September, these plots recovered, and at harvest time no difference could be observed.

GRAIN YIELDS.

Sparse Stooling Variety—S.H.J.—planted 14th May. Superphosphate 22%—equalling 150lbs. per acre.

Rate of seed per acre.	Computed Yield per acre.										Average.		Percentage.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
60 ...	15	36	15	44	16	56	16	24	16	8	16	10	98
Control. 45 ...	16	56	15	44	16	32	16	40	16	56	16	34	100
90	15	52	16	40	17	20	16	56	18	48	17	7	103

Free Stooling Variety—Nabawa—planted 14th May. Superphosphate, 22 per cent.—equalling 150lbs. per acre.

Rate of seed per acre.	Computed Yield per acre.										Average.		Percentage.
	Section 1.		Section 2.		Section 3.		Section 4.		Section 5.				
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
60	24	40	23	44	24	8	23	20	23	28	23	52	101
Control 45	24	16	24	—	24	40	23	36	22	14	23	40	100
90	24	8	23	44	24	—	23	44	22	14	23	34	100

It will be noticed that the results are remarkably even, which indicates that the conclusion drawn from the experiments at Merredin, viz., that the sowing of 45lbs. of graded seed is sufficient, and can be continued with confidence.

The Rate of Superphosphate Experiment.—The soil was of the tussocky and smoke bush type of plain, but inclined more to the former, *i.e.*, from 9 inches to 18 inches of sand overlying a gravelly cement.

All plots germinated well, and up to the beginning of August little difference in the plots was noticed, but with the advent of warmer weather, the plots having the heavier dressing of superphosphate advanced more

quickly than those receiving 75lbs. per acre. However, by the end of August the foliage of the plots receiving the heaviest dressing was showing the effects of the dry spell more so than the plots with the lighter dressings.

The results obtained were:

GRAIN YIELDS.

Variety—Nabawa—Planted 14th May. Rate of Seeding—60lbs. per acre.

Rate of Super. per acre.	Computed Yield per Acre.										Average Yields.		Percentage.
	Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	
150 ...	22	32	20	8	19	44	19	20	16	40	19	41	129
Control													
75	16	16	14	40	15	20	15	28	14	32	15	15	100
225 ...	22	16	17	20	18	8	16	8	15	28	17	52	117

There is a considerable difference in yields of the plots receiving the increased amount over that of control plot of 75lbs., which indicates that this amount can be increased with advantage on this class of soil.

The Seasonable Planting Experiment.—The object of this experiment is to determine the most suitable time to plant the different types of wheat according to their maturity—Late, Midseason, Early, and Very Early.

For this experiment the varieties used were Yandilla King (late), Nabawa (midseason), Gluyas Early (early), and S.H.J. (very early). Gluyas Early being treated as control and planted in May.

It was intended to have three plantings, April, May, and June, but owing to preparations not being complete the April section was not planted.

The soil was slightly gravelly to tussock and smoke bush country. The growth of the plots was regular in all sections, but the plots planted in June were very backward throughout.

Rate of Superphosphate Trial:
Wongan Hills Light Land Farm, 1925.

The results are shown hereunder:—

GRAIN YIELDS.

MAY PLANTING.

Planted 13th May, 1925—Seed, 45lbs.—Superphosphate (22 per cent.) 116lbs.

Date of Planting.	Variety.	Computed Yield per Acre.										Average.		Percentage.
		Sec. 1.		Sec. 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	
	Control.													
May 13	Gluyas Early ...	17	36	17	20	17	4	17	44	17	44	17	30	100
	S.H.J	16	24	19	20	15	44	17	4	16	24	16	59	97
	Nabawa	19	52	19	4	20	24	20	8	17	44	19	26	110
	Yandilla King ...	18	48	18	24	19	44	20	8	16	48	18	46	106
	Control.													
	Gluyas Early ...	20	8	16	48	17	4	18	0	16	24	17	41	100

JUNE PLANTING.

Planted 17th June, 1925—Seed, 45lbs.—Superphosphate (22 per cent.) 116lbs.

Date of Planting.	Variety.	Computed Yield per acre.										Average.		Percentage.
		Sec. 1.		Sec 2.		Sec. 3.		Sec. 4.		Sec. 5.				
		bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	bus.	lb.	
	Control.													
May 13	Gluyas Early ...	18	8	17	4	16	16	18	8	17	20	17	23	100
June 17	S.H.J.	10	32	10	16	9	44	9	52	10	16	10	8	59
	Gluyas Early ...	10	40	10	16	9	28	9	28	9	52	9	57	58
	Nabawa	10	24	10	48	11	28	11	52	12	40	11	26	67
	Yandilla King ...	9	28	9	44	9	52	9	12	11	12	9	54	58
	Control.													
May 13	Gluyas Early ...	17	12	16	48	17	12	15	36	17	20	16	50	100

PERCENTAGE RESULTS.

Variety.	Grain Yields.	
	May.	June.
Nabawa	110	67
Yandilla King	106	58
Gluyas Early	100	58
S.H.J.	97	59

The generally accepted opinion that when planted later in the season the early maturing varieties, such as S.H.J., give better yields than do later maturing varieties, is not confirmed by this experiment this year, but the results confirm the practice generally adopted, that the seeding operations should be completed by the end of May.

MILK AND CREAM.

P. G. HAMPSHIRE,
Superintendent of Dairying.

In view of the large number of new settlers who, during the last two years, have embarked upon dairying in Western Australia, more particularly in connection with group settlements, it is felt that advice in regard to "The Care of Milk and Cream" following the course of its handling and attention from the cow to the factory might be of material benefit.

An attempt will be made in simple language to set out the various factors in regard to the proper handling of milk and cream, drawing attention to the work that should be done, and particularly the pitfalls to avoid, at the same time to explain the causes of the variation in the test of cream, and describe the faults of cream—their detection, cause and remedy. With regard to these latter aspects from the producer's point of view, some knowledge of the various factors in this regard is beneficial to dairymen in locating the reason for variations in the test of butter fat as shown by the factories, and permits of a better understanding between the factory manager and the dairymen, particularly as it will enable them to interpret the factory manager's remarks regarding second grade cream and to remedy the trouble. Second grade cream is a source of individual and national loss, and, seeing that in this State the variation in the price of first grade cream and second grade cream ranges from 3d. to 4d. per lb., it becomes a serious item to individual dairy farmers where large percentages of such cream exist.

HEALTH OF THE HERD.

Individual cows in bad health, cows that have not "cleaned up" after parturition (calving), and cows in sexual heat, will invariably give milk that will not "keep." Milk from newly-calved cows should not, as a general rule, be used within four days after calving. A simple test is to boil a cupful, and if it does not curdle it may be used. Some cows' milk may be used in three days, others will not be fit to use until perhaps ten days. This milk ("beasting" or "colostrum") is low in fat test and quickly goes bad. It should be given to the new-born calf.

CLEANLINESS IN MILKING.

Clean udders, teats, and flanks of the cow, and hands and clothes of the person, are essential if good keeping milk and cream are to be obtained.

STRAINING THE MILK.

The straining of milk is desirable to catch flies, dust, hairs, etc., that may gain access during the milking. Strainers should be fine wire gauze that are easily taken to pieces. Aëration improves milk.

STORING MILK.

Milk awaiting separation should be stored in the cleanest possible place, free from smells, flying dust, etc.

SEPARATION OF MILK.

Milk, for preference, should be separated as near as possible at the temperature it leaves the cow. The machine does best work. It avoids

variation in the test and loss of fat. Separate the cream into a clean vessel each time (*not one cream on top of another*), and when cooled down mix with bulk and *stir*. Separate the cream at 40 to 45 per cent. fat test in the summer and about 30 to 35 per cent. in the winter. The more milk there is in the cream in the summer, the quicker it will sour, curdle, and, later, ferment.

COOLING OF CREAM.

It is of great advantage to cool cream immediately it leaves the separartor, and while it retains the animal heat. If 20 to 30 degrees can be taken out of the cream quickly in its early stage, it will keep longer and in a much better condition. The "Throsby" and "Fram" cooler are a cheap means of cooling cream direct from the separator.

HOLDING THE CREAM IN THE DAIRY.

The dairy should be thoroughly clean and free from the presence of such strong smelling articles as pork, bacon, meat, fruit, potatoes, onions, skins, etc. Cream will absorb all odours readily. The dairy should be kept entirely for the storage of milk and cream. It should also be free from the direct rays of the sun: if exposed to the sun and light cream becomes oxidised and produces tallowy butter—a bad fault. Cream is best stored in one large vessel standing in cement or wooden trough, surrounded by cold water.

STIRRING CREAM.

The stirring of cream is of great advantage. It frees the gases that form, prevents the fat coming to the surface, assists the cream to ripen evenly, prevents lumps, and also oxidisation of the surface. The cream will keep longer and be in better condition. The stirrer should be made of metal (not wood)—*tinned steel* for preference. Wooden stirrers become cream-saturated, foul and impossible to wash. Stir with *up and down rotary* motion to mix top with the bottom—a thin tinned steel rod with a saucer-shaped disc attached to the bottom is most suitable and can be purchased from tinsmiths (or made) cheaply.

COVER THE CREAM.

Wire gauze should be used to cover the cream in order to prevent flies, dust and vermin gaining access to it while in the dairy pending delivery to the factory. Cover the cream also when on the way to the station or factory from the heat of the sun. A good plan is first a wet, and then a dry, bag over the can. Cover the cream while waiting for the train, boat, or waggon; never allow the sun to beat down on the can, as it will soon turn the cream second grade.

SEPARATOR.

Always take the separator to pieces, rinse with cold water and then wash the bowl and disc thoroughly with hot water and soda after *each time used*. Never leave it standing, merely running hot water through it, and then put through the milk next time. It is a filthy practice, and is the *cause of more second grade cream* than any other reason. The bowl of the separator acts as a clarifier during separation, and if not cleaned before again using, it becomes foul and evil smelling. Be sure to take to pieces and wash thoroughly after each time used. Do not let discs stand in a

heap wet—they will rust and wear out quickly. Rust is bad for milk and cream.

METHODS RECOMMENDED IN WASHING DAIRY UTENSILS.

First rinse with cold water (if milk and cream covered utensils are steeped into hot water portions "stick" on owing to the coagulation of the albumin); second, thoroughly wash with brush (not rag) with hot washing soda water and finally steep in boiling water.

All cans, buckets and utensils, after being thoroughly washed, should be stood out in the sun, away from dust.

BAILS AND YARDS.

The bails and yards should be cleaned of droppings daily; the bails swept and washed down.

MILKING MACHINES.

Whilst milking machines do the work of milking in less than half the time, they mean much more time in the dairy to wash up, and owners cannot be too careful—first, immediately the last cow is finished, pump cold water through the machine, then hot washing soda water. Take the machine to pieces, run brushes through tubes and pipes, etc., and when thoroughly clean keep submerged in lime water. It prevents the rubbers from cracking, keeps them sweet, and adds to their life. When starting up, pump cold water through first. It makes them easier to clean and carries off any "mustiness."

STRONG SMELLING FEEDS.

Herbage and strong smelling feed should not be fed to cows *during* milking or *immediately before.* Many pungent, strong-flavoured feeds can, with safety, be fed *after* milking, without tainting the milk and cream.

SEND CREAM TO FACTORY.

Cream should be sent to the factory as often as possible. Do not keep any back to fill a can if you can avoid it.

RUSTY UTENSILS.

Do not use rusty buckets and cans. Rust imparts a bad flavour to milk and cream. Open cracks in cans and buckets are very bad, being impossible to thoroughly cleanse. You cannot be too careful in regard to cleanliness, first, last, and all the time.

CAUSES OF VARIATION IN THE TEST OF CREAM.

SOME FACTORS.

A few points regarding the many causes of variation in the "test" or "thickness" of the cream may be of interest in view of the variation in the test being the "bone of contention" so often between the farmer and the factory.

HEALTH OF THE HERD.

This applies more particularly to the small herd. Cows in bad health invariably drop in the test: one or two sick will make a difference in the

test of the bulk milk. Newly-calved cows often affect the test. With variations in the test of the milk of the herd, will, even if put through the separator in the usual way, mean a variation in the test of the cream.

TEMPERATURE OF MILK.

Variation in the temperature of the milk put through the separator from time to time will alter the test of the cream—the lower the temperature, the lower the test; the higher the temperature, the higher the test. Milk should be separated at about the temperature it leaves the cow, viz., 98°.

FEEDING MILK TO SEPARATOR.

Uneven feeding of milk into separator means uneven test. A "Float" will sometimes "stick" unknown to the operator. If the milk rushes in too fast, a low "test" will result; if slow, the "test" will be high.

CREAM "SCREW."

Sometimes the cream "screw" works loose during separation through not being tight. If it moves *in* half a turn, it will probably mean 5 per cent. higher test; if it works *out*, it will mean a lower test.

SETTING SEPARATOR.

A separator not set perfectly level and rigid will result in variable tests.

TURNING HANDLE OF THE SEPARATOR.

Uneven turning of the handle of the separator means great variation in the "test." This is generally the most frequent cause of tests varying; the slower the handle is turned the lower the test; the quicker it is turned, the higher the test.

RINSING CREAM OUT OF BOWL OF SEPARATOR.

The amount of milk or water (latter preferred) that is used to flush the cream out of the bowl of the separator when finishing separation is often the cause of a thick or thin cream. A certain amount goes into the cream—it may be a spoonful, it may be a pint. Naturally it will alter the test from day to day.

HAND-SKIMMED CREAM.

With hand-skimmed cream, the variation will depend upon the amount of milk that is collected with the cream, and which must necessarily be of varying amounts.

Remember these causes when your tests vary at the Factory.
If not satisfied, go and see your own Cream tested by the Manager.

THE FAULTS OF CREAM—THEIR DETECTION, CAUSE, AND REMEDY.

1. *"Washy" Cream—*
   Detection: Appearance and insipid flavour.
   Cause: Too thin.
   Remedy: Thicken cream.

2. *"Curdled" Cream—*
   Detection: Appearance.
   Cause: Too thin; not sufficiently cooled; mixing hot and cold cream together.
   Remedy: Thicken cream; cool. Do not run warm cream direct from the separator on to cool cream already in the can.

3. *"Over-ripe" Cream—*
   Detection: Strong sour flavour.
   Cream: Too thin; want of cooling; the use of stale milk or cream covered vessels.
   Remedy: Thicken cream; cool. Clean vessels and utensils.

4. *"Feedy" Cream—*
   Detection: Flavour and smell, especially first flavour.
   Cause: Feeds such as wild carrot, stinkwort, lucerne, and clovers being fed to the cows, or the close proximity of any high-smelling feed or fruit to the milk or cream.
   Remedy: Avoid feeding cows with such strong-flavoured feeds four hours prior to milking. Do not store milk or cream near strong-smelling vegetables or fruit, etc.

5. *"Bitter" Cream—*
   Detection: Flavour and smell.
   Cause: Cream too thin; want of cooling and stirring.
   Remedy: Thicken cream; cool and stir.

6. *"Fermented" Cream—*
   Detection: Flavour and smell; presence of gas in the cream.
   Cause: Cream too thin; want of cooling; uncleanliness in milking, handling, and utensils, etc.; sometimes caused through feeds.
   Remedy: Thicken cream, cool; proper cleanliness.

7. *"Mealy" Cream—*
   Detection: Broken texture and mealy flavour.
   Cause: Cream too thick; age.
   Remedy: Cream should be thinned; stir; and send to the factory more often.

8. *"Unclean after Flavour"—*
   Detection: Taste, especially the last flavour in the mouth.
   Cause: Unclean methods in milking and handling.
   Remedy: Strict cleanliness.

9. *"Metallic" Cream—*
   Detection: Taste similar to metal or tin.
   Cause: Friction of cream inside the can on warm days, especially when the can is exposed to the direct rays of the sun, in transit to the factory.
   Remedy: Avoid jolting cream as much as possible in transit; cover from the direct rays of the sun

10. *"Oxydised" Cream—*
    Detection: Surface taste unpleasant.
    Cause: Exposure of a large surface of the cream to the air or sunlight.
    Remedy: Keep cream in dairy away from the possibility of the sun striking the surface, using two thicknesses of cheese cloth to cover the vessel.

11. *"Tallowy" Cream—*
Detection: Taste very strong of tallow.
Cause: Advanced metallic and oxydisation—a very bad fault of cream: pasteurisation does not improve.
Remedy: See "Metallic" and "Oxydised."

12. *"Unclean" Cream—*
Detection: Taste and smell.
Cause: Carelessness and uncleanliness in the handling of the milk or cream.
Remedy: Strict attention to cleanliness in milking, handling, and the washing of utensils, particularly separator parts each time used.

13. *"Sweet Stinker"—*
Detection: Smell.
Cause: Presence of a large number of filth germs preventing the growth of good lactic germs, due to unclean methods.
Remedy: Strict cleanliness as advised in No. 12.

14. *"Cheesy" Cream—*
Detection: Taste and smell being similar to that of cheese.
Cause: Advanced mealiness and fermentation more particularly with thick cream due to decomposition of casein, uncleanliness, and age.
Remedy: Strict attention to cleanliness. Avoidance of the cream being too thick; frequent stirring. Forward to factory more often.

15. *"Butyric" Cream—*
Detection: Taste and smell.
Cause: Germ "B. Butyricus" which has the power of splitting up the fat. Causes rancidity in butter. Gains access to cream through unclean methods, the age of the cream and want of stirring largely contributing to this trouble.
Remedy: Strict cleanliness, stirring, and forwarding to the factory more frequently.

16. *"Albuminous" Cream—*
Detection: Taste and smell particularly obnoxious.
Cause: The cream from sick cows or newly calved cows, or cows advanced in lactation.
Remedy: The avoidance of the use of milk from cows suffering from any ailment, or the milk from cows that have newly calved.

17. *"Fishy" Cream—*
Detection: Taste and smell similar to sour bread.
Cause: Germ "Oidium lactus" which is nearly always present in large numbers in separated milk troughs that are not properly cleaned, or in old milk which may be stored near the dairy.
Remedy: Clean around dairy daily. Do not store any stale separated milk close to dairy.

18. *"Ropey" Cream—*
Detection: Stringy or ropy appearance when poured.
Cause: Germ "B. viscosus" to be found in stagnant pools and swamps, or may be present in stale tank water.
Remedy: Cleanse cow's udder and flanks in cases where herd wades through stagnant water. Boil water used for cleaning utensils.

HORTICULTURAL NOTES.

Geo. W. Wickens,
Officer in Charge Fruit Industry.

SEASONAL WORK FOR APRIL, MAY, AND JUNE.

April.

Harvesting the fruit crop during this month will still form the major portion of the work to be performed by owners of deciduous fruit trees. Apple and pear growers especially will be busy gathering and packing for export, local markets, and storage.

When writing the horticultural notes for April, 1925, I mentioned that the apples forwarded from Western Australia to England, in the season 1924, were not of the high standard of quality which this State's shipments usually attained, and expressed the hope that, with the very favourable season obtaining in 1925, growers would seize the opportunity of wiping out any bad impression that might have been created in 1924, and by rejecting oversized and blemished fruits ensure that the apples in the red cases would do as they had often done before—top all competitors' returns by shillings per case. In spite of some adverse criticism, which I have no doubt was fully justified, as to the condition of a proportion of our shipments on arrival in England, I am quite satisfied from the prices received, which in practically every market were higher than our competitors, that to a very great extent our growers delivered the goods.

If further evidence were needed it is furnished by the number of agents who this season are buying Western Australian apples at very satisfactory prices on rails, growers' sidings, for shipment to London, and it is on this phase of marketing that I wish to offer a few words of advice.

The good name enjoyed by Western Australian apples on the London market has been built up from the inception of the export trade, mainly from consignments which have been forwarded on growers' account, the grower retaining his interest in the fruit until the time of sale in London; but in recent years the practice of selling a portion of the crop on rails has been adopted, and the quantity disposed of in this way is annually increasing. Personally I think it is a very desirable development, for it enables the orchardist, who is not in a position to risk the chance of London prices, to obtain a payable return and immediate cash as soon as the fruit has passed the inspector.

It has, however, come under my notice that not every grower is sufficiently careful in making sure that his consignment is up to the grades and sizes branded on the cases, and which, moreover, he has contracted to supply to the purchaser.

So far as is possible with a limited number of inspectors and a limited time in which the inspections must be made, the wrongly branded and inferior fruit is rejected by the examiners, but in every large shipment there is always a chance that some may escape detection and go forward, to the detriment of everyone concerned.

Under Commonwealth Regulations three grades of apples, "Special," "Standard," and "Plain," are provided for, and these allow (at any rate so far as Western Australia is concerned) all apples fit for the export trade to be shipped, and whether the fruit is being exported on growers' account or sold at sidings the old adage of honesty being the best policy obtains every time, for no trade can flourish when the buyer is placed in the position

of doubting the truthfulness and honesty of the seller, such as occurs when the standards and sizes are wrongly described.

Continue baiting for fruit-fly during April, and carefully destroy all infested fruits.

In orchards where citrus Brown Rot showed up last season, orange and lemon trees should be sprayed towards the end of this month with Bordeaux or Burgundy mixtures, using 4lbs. bluestone, 4lbs. freshly burned lime, 50 gallons of water; or 4lbs. bluestone, 6lbs. washing soda, 50 gallons of water. Confine the spray to a height on the trees of four feet to five feet from the ground, and give the ground under the trees a liberal dressing also. If the trees are sprayed all over with a fungicide the beneficial fungi attacking black and soft brown scales are destroyed, and these pests increase in number. By leaving a portion of the trees unsprayed this danger is guarded against.

Apply superphosphate and potash to the land before the end of the month, and sow peas for ploughing under in early spring.

Prepare land thoroughly this month where new orchards are to be planted. Subsoil or plough to a depth of 10 inches to 12 inches, and remove all native roots.

May.

Pruning stone fruit trees commences before the end of this month, but varieties of peach and nectarine trees which have a habit of shedding their buds should not be pruned until the buds burst in early spring.

The first spraying to control San José Scale should be applied before the end of the month; to be followed later in the season, preferably towards the end of August, with a second application.

In the early days of the fruit industry in Western Australia, when San José first appeared in the orchards, the pest was thought so difficult to control that many trees were rooted out and burned to keep the pest in check; but with more experience it was proved that, provided spraying was thoroughly carried out while the trees were dormant, the disease could be reduced to such an extent as to make it a hard matter to discover any live specimens during the following summer. Unfortunately "familiarity breeds contempt," and there are some growers who are inclined to treat what is undoubtedly a most serious pest with insufficient consideration. If left to its own devices San José Scale will in a very few years partially kill such trees as apples, pears, peaches, and plums; I do not know any orchardist who allows this to happen, but what is occurring is laxity in spraying; either the trees are not being sprayed often enough, or not properly coated with the mixture, or the material used is of insufficient strength.

In season 1925 several consignments of apples were refused export permits on account of infestation by San José Scale, and growers only have themselves to blame for not carrying out proper control methods in the previous winter.

To keep San José Scale in check it is necessary to spray twice while the trees are dormant, the first to be applied as early as possible after the leaves have fallen and the second towards the end of winter. As August is often a wet month, special care should be exercised in making the May application a very thorough one.

Use commercial lime sulphur at a strength of one gallon in ten gallons of water, or if the pest is very bad the strength can be increased to one in eight. Lime sulphur can be used for both sprayings, or a reliable brand of spraying oil may be substituted for one of these.

If the weather remains fine continue baiting for fruit-fly, and if not fine enough for efficient baiting commence using fruit-fly traps.

Where orange and lemon trees in orchards showing infection last season were not treated for Brown Rot during April, they should be sprayed as early as possible in May.

June.

Push on with the pruning of deciduous trees during this month.

Deciduous trees may be planted when the soil is in good friable—not sticky—condition.

Heel the young trees in and cover the roots well with soil as soon as they arrive from the nursery. If by any chance San José Scale orchards did not receive the first spraying last month they should be treated as early as possible in this.

Citrus growers should examine cracked oranges for signs of fruit-fly, and destroy any found to be infested.

Fruit-fly traps should be in use in citrus orchards from now until the end of the winter.

Orange export commences this month.

Many of the navels in the later districts will still lack sugar, and great care should be exercised when picking to gather only those that have attained maturity. I take this opportunity of again stressing the necessity in every operation connected with orange export for handling the fruit with extreme care to prevent scratching the skins or bruising the tissues.

FRUIT-FLY.

WINTER TRAPPING EXPERIMENTS.

L. J. NEWMAN, F.E.S.,
Entomologist.

During the winter months of May to September a further trapping experiment was undertaken to test the relative virtues of several lures. The period of the test was from the 29th April to the 1st September, 1925. The lures used were:—

(1) Harvey's—a Queensland preparation.
(2) Green's—a local proprietary preparation.
(3) Newman's—a local proprietary preparation.
(4) Pollard, borax and water.

As the comparative tests proceeded it was found that the Harvey lure was almost non-effective, and was, therefore, discarded.

The results of the test are shown hereunder in tabulated form:—

Lure.	No. of Traps.	Period.	Males.	Females.	Total.
Green's	2	29–5–25 to 1–9–25	35	855	890
Newman's	2	„	21	594	615
Pollard and Water... ...	2	„	14	268	282
				Total ...	1,787

From a perusal of this table it will be noted that Green's lure captured 275 more fruit-flies than Newman's over the period of the test, and 622 more than the pollard mixture.

In fairness to the Newman's prepared bait it has to be pointed out that it is not sold as a trap lure, but as a foliage bait.

Green's bait has not been officially tested as a foliage bait. Its proving so attractive in traps, however, would indicate that it will no doubt be an effective foliage bait.

In explanation of the comparatively low capture recorded in the pollard home-made lure it has to be remembered that this lure acts as a sex stimulus.

During the months over which the test was applied there is little or no mating of the fruit-flies, the fertile over-wintering females being mostly in evidence. These females are, therefore, not readily attracted to the lure, but fall victims to the traps containing a tempting food.

As a lure during the breeding season of the fly, from September to May, the pollard mixture is effective. For winter trapping, however, Green's lure is the most effective.

Every fly captured in the winter and spring is effectively reducing the early summer attack, and any baits or lures that will accomplish this purpose are strongly advised to be used. In view of these tests growers can with confidence use either of the proprietary baits. Growers can, however, just as confidently use the home-made mixtures as published in Bullletin No. 122, but which were not included on this occasion.

One point that needs emphasising in the use of home-made fruit juice bait is the need for applying same within 12 to 16 hours after making. This is necessary owing to the liquid rapidly fermenting if kept longer.

PHOSPHATIC FERTILISERS AS MANURES FOR GRASS LAND.

A. B. Adams, Agricultural Adviser, Dairy Branch.

A further physical effect that has been noted as a result of the top-dressing of grass land, is that the soil was kept cooler and clay soil tended to crack less: these effects being due to the increased herbage shading the soil. Over a period these effects can be expected to increase, as the accumulation of humus in the soil will help to retain moisture and also improve the texture of a clay soil.

Bacterial Changes.

In addition to the direct physical and chemical changes in the soil due to the application of phosphoric acid, in a form available to plants; it is considered by Dr. Robertson that there is a change in the soil bacteria, and bacteria being a low form of plant life they are in common with other plants dependent on phosphoric acid; an increase in the amount of this substance present in the soil will tend to cause an increase in the numbers of the soil bacteria, with consequent improved fertility, as a dead soil is an infertile soil.

A Practical Method of Soil Improvement.

As in countries where the practice of agriculture is very old, it has been found necessary, on soils which were never perhaps very rich in available phosphates, and which have been depleted by cropping, or by long continued grazing without replacing the plant food removed, to use phosphatic manures as a top-dressing, so when dealing with soils in this State which are deficient in phosphates, it is necessary to use phosphatic manures if the best returns in meat, milk, and wool are desired.

The commonly held view of European experts is, that poor grass land should not be ploughed until it has been improved by top-dressing, as there is no cheaper way of improving a poor or run-down soil than to improve the growth and feeding value of existing herbage, so increasing the humus content of the soil by the addition of a larger amount of animal excreta and increased root growth. Not only will there be an increase in the amount of humus, there will also be an increase in its value as plant food.

Our grass land problem is somewhat different to that in England; there the object is to encourage the clovers and better plants and choke out worthless inferior ones, here on many soils there are small clovers and trefoils present, which immediately become predominant on giving a comparatively light dressing of a phosphatic manure.

In England the desired result appears to have been obtained most efficiently by the use of heavy dressings, up to 10 cwt. per acre, of basic slag, and the dressing repeated after five or ten years. From observation in this State it is safe to say that a more profitable result will be obtained by the use of one cwt. of a good phosphatic manure, per acre, per annum, over a period of ten years.

Top-dressing is reported as having practically eradicated bracken fern in some Victorian soils, and the same thing appears to be taking place in this State. Not that it has an injurious effect in itself on the bracken and scrub, as probably if there were no other factor concerned they would grow more vigorously for the manuring. The reason that the bracken and scrub become weak and tend to disappear is because the growth of better plants, particularly the clover, is largely increased, thus increasing the stock-carrying capacity and the increased treading consolidates the land, altering the conditions in this respect. Bracken does not thrive as well on solid land as

on a fluffy open soil, and many native plants die out when the conditions are altered. Also stock nibble at other plants for a change.

The writer has seen the fronds of bracken eaten by both cattle and sheep, not because they were starved to it, but because they liked something hard and dry as a change from the succulent clover.

Financial Results.

Farming is a business, and the justification for any farming practice is in the financial results. The farmer who grows wheat uses super. when putting in his crop, as he realises that, except on particularly good soils, all the previous labour, the clearing, cultivating, etc., of the land would go for little or nothing without a few pounds of superphosphate per acre.

It is necessary for the farmer to realise that grass is also a crop and a crop even more dependent on the addition of substances which are unavailable, or deficient in the soil than are cultivated crops. In the case of the latter the working and consequent aeration of the soil tends to render unavailable plant food more available. In the case of permanent grass land, the soil for a period becomes more dense and consolidated and at this stage which is a critical period in the history of a pasture, there are few if any forces at work to make unavailable plant food available. After a period land under grass improves in texture, as the soil is opened up by the fine plant roots, and when these roots die channels are left in the soil admitting air. With the increased amount of humus and decaying vegetation carbon di-oxide is given off, which in solution in water has a solvent action on some of the otherwise unavailable mineral reserves in the soil.

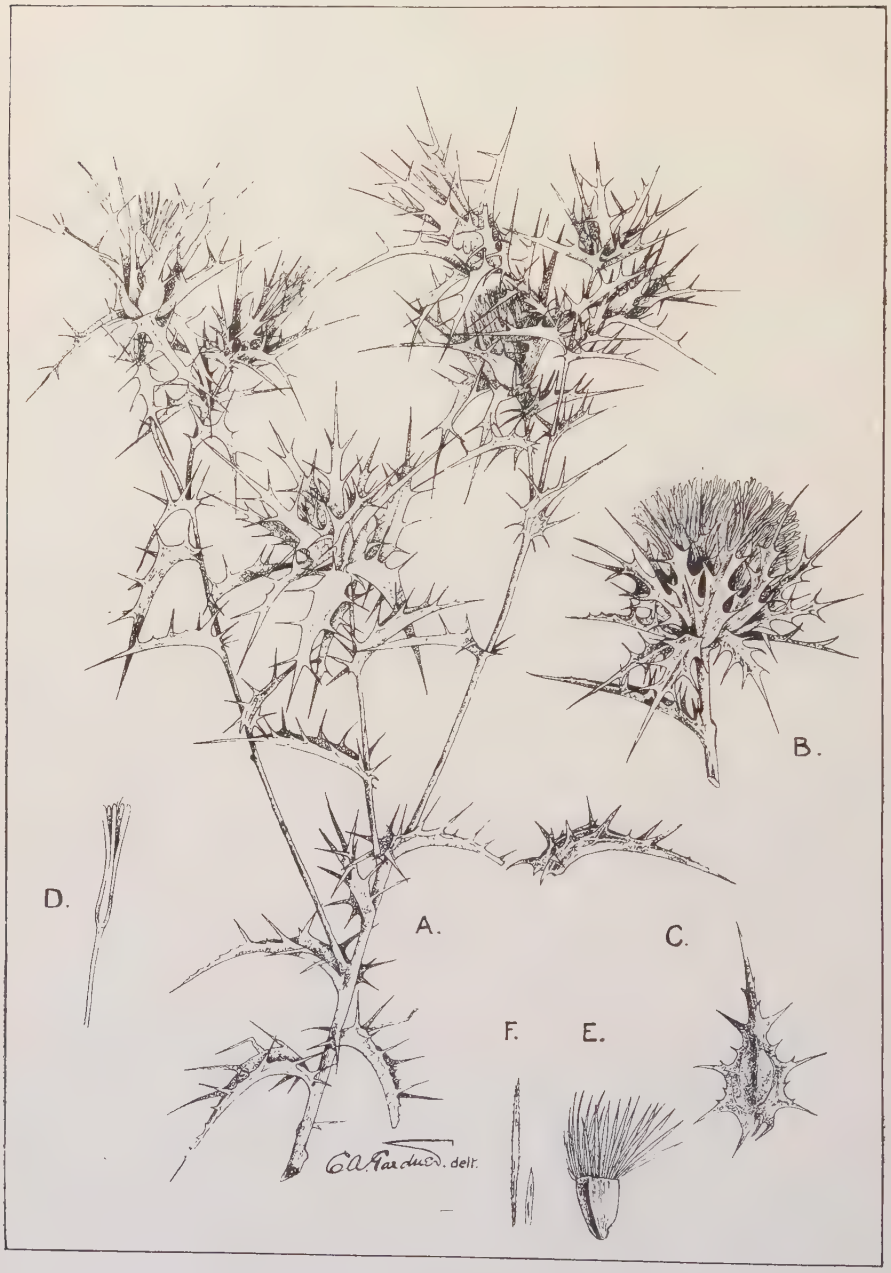
There are no exact figures available of the cash results of top-dressing grass land in this State, but observation and experiment show that in the areas of heavy rainfall one acre of top-dressed land grows from twice to eight or more times as much feed as an acre of similar land not topdressed. Though the apparent increase is so great, the actual stock-carrying capacity will usually be increased to an even greater extent, as **the feeding value of a plant is governed by the soil on which it grows.**

If the soil is deficient the plant will also be deficient.

The cost of superphosphate as an annual application frightens many from top-dressing more than a limited area each year, but in a great many cases, the amount required to purchase manure will be less per acre annually than the interest charge on the cost of clearing, previous cultivation, etc., therefore if it was good business to outlay capital in clearing, it is much better business to spend an annual amount which will probably amount to less rather than more than the interest on first cost, when by so doing such a much greater return is to be obtained. Further, if the land is regularly top-dressed not only will an immediate return be obtained in increased stock-carrying capacity, which will probably pay some if not all the interest charge on previous capital expenditure, as well as the cost of the manure; but also there will be a resultant steady improvement in the quantity and quality of feed on the area. Failure to fertilise will just as surely lead sooner or later to a run-down pasture, unthrifty, poorly grown stock, and unsatisfactory financial returns.

Actual financial results depend upon the state of the markets, the class of farm and its situation and soil, and the business acumen of the farmer; but there is no farming operation, in districts with an annual rainfall of over 25 inches, which is likely to give such consistently good returns as the regular top-dressing of pasture. It is safe to say that if any shares on the market showed a likelihood of paying as good a percentage on the outlay as does judicious top-dressing, there would be an immediate rush for the scrip.

(*To be continued.*)



STAR THISTLE (*Kentrophyllum* (*Carthamus*) *lanatum*).

A. Portion of stem. B. Flowering head (*capitulum*). C. Two views of a leaf. D. Flower (upper portion). E. Achene ("seed"). F. Pappus scales. (D., E., and F. enlarged, the others slightly reduced.)

STAR THISTLE.

(*Carthamus lanatus*, L., or *Kentrophyllum lanatum*, D.C.)

W. M. CARNE, F.L.S., AND C. A. GARDNER.

The Star Thistle was gazetted as a noxious weed for the whole State under the Noxious Weeds Act of 1924, and its eradication is compulsory under the law. The plant is also a declared noxious weed in New South Wales, Victoria, and South Australia. Its introduction into Australia is comparatively recent: the first record of its appearance as a bad weed being in South Australia in 1887, when an Act was introduced "For amending the Act, No. 26 of 1862, and for preventing the further spread of the Star Thistle."

In Western Australia the weed is not particularly common except in certain districts, but its distribution extends along the western coastal plain between Geraldton and Busselton, and it has appeared to the east of the Darling Range in the Toodyay, York, Quairading and Gnowangerup districts.

Unlike many of our thistles the Star Thistle seeds are not adapted for wide distribution by the wind, but they readily adhere to the fleeces of sheep and clothing, and the heads, which break from the plant, may also be wind-distributed, and readily attach themselves to stock. Flood waters may also play an important part in distributing this plant.

The Star Thistle is usually known under the name of *Kentrophyllum*, and is gazetted as such, but the older name—dating back to 1735—is *Carthamus*. Other common names by which it is known are Saffron Thistle and Chinese Thistle. It must, however, be distinguished from the Cockspur Thistles (*Centaurea*) which in Eastern Australia are commonly spoken of as Star Thistles.

Originally a native of the Mediterranean region and Western Asia, Star Thistle has become established in many countries and is found in most of the Australian States. A sister species, *C. tinctorius*, is the Safflower of India and China, producing two colouring matters—red and yellow. The red is used for dyeing fabrics in shades ranging from pink to crimson, also for making rouge; the yellow being an adulterant or substitute for saffron. The Star Thistle produces a yellow juice, the stain being apparent when the green plant is broken.

Germination takes place during the autumn and spring, the erect growth commencing usually about October and flowering in the summer. The height of the plant may exceed seven feet, but is usually between two and three feet. Under ordinary circumstances the plant only flowers once from the same roots, but in exceptional cases it may pass into a second year of growth. Stock will eat the plant while in a young state in the absence of better feed, but when the stems become hard they avoid it. If cut green animals will eat it when it has dried, but it cannot be said to have anything to recommend it from this point of view. In pasture lands the plants frequently grow in colonies so dense that no feed will grow with them, forming impenetrable patches which stock cannot enter. Sheep feeding on the plants are apt to develop ulcerated mouths, while they may become lame from the sharp spines of the leaves. As the plants mature the leaves and flower heads become brittle, thus breaking away easily, and, adhering to the fleeces of sheep, render both the animals and wool difficult to handle and comb.

The following Road Board Districts in Western Australia have reported the existence of Star Thistle:—

Geraldton, Greenough, Murray, York, Toodyay, Avon (Quairading), and Gnowangerup. It also occurs at Spearwood and Capel.

Description of Plant.—Annual. Stem rigid and erect, 2-7 feet in height, distinctly streaked with raised lines, its upper portions and branchlets somewhat webby-woolly, at least when young. Leaves short, rigid and spreading, bright green, prominently veined and spiny-toothed, the terminal spine being the longest, the lowest leaves shortly stalked, the upper ones clasping the stem. Flower-heads solitary, surrounded by spreading leaves, the bracts gradually passing from the leaf-like forms of the outside of the head to the small toothless semi-transparent innermost forms; florets numerous, intensely yellow, somewhat streaked towards the tips when old, and hairless. Fruit seed-like, rather resembling shuttlecocks, the greyish base four-angled, the feathery portion of the shuttlecock represented by stiff semi-transparent minutely fringed scales. (For further details see plate.)

Control.—Eradication is only possible where all co-operate, since every place in which it is allowed to seed becomes a source of infection to the neighbouring paddocks. Handpulling or hoeing is a method of control usually effective where the weed has not secured a firm hold, *i.e.*, where it still occurs as scattered plants or small clumps. This method is regularly and successfully practised on many stations in South Australia and by some pastoralists in the Victoria District of Western Australia. Pulling or hoeing should be done before the plants flower, if possible, making sure that the root crown is destroyed, or otherwise the roots will produce fresh shoots. The roots should be severed about three inches below the ground level. If the plants have been allowed to flower the heads should be collected in bags and removed for burning. If this is not done, the dying plants may still ripen seeds. Where the area is large and the ground sufficiently level, cutting the thistles with a scythe or mowing machine, followed by burning, usually controls the weed. In smaller areas, fairly heavily stocked with cattle, if the plants are cut down before flowering, the cattle will trample them and reduce the sucker growths, even if they do not eat them.

Where pulling or hoeing is rendered impossible owing to the extent of the affected areas, or the thistles are in stony ground where it is impossible to cut them, a more effective method is to spray the plants with arsenate of soda (1lb. to 16 gallons of water) before they are allowed to seed. This method has been applied with success in the Murray (W.A.) district. (See *Journal of Agriculture* for December, 1925, p. 512.) Stock should be excluded from the areas sprayed with the arsenical solution until after the soil has been wetted with the following early winter rains.

On arable land cultivation is the best way of eradicating large areas of Star Thistle. Burn off the thistles and plough as early as possible. Keep the fallow clean throughout the year with sheep, and harrow occasionally. Cultivate the soil in the following autumn, delaying the sowing operations as long as possible to allow of early germination of the thistle seed, then sow a hay crop, and eradicate with a hoe any thistles which appear after the crop has been reaped.

Where infection is not heavy, a hay crop following cutting and burning of the thistles will check most of the seedlings. Those which grow with the crop will be cut with the hay before they seed.

MATING THE FLOCK.

H. McCALLUM,
Sheep and Wool Inspector.

Many farmers who breed sheep often find that they are not making the progress they expected in the first year or two. They should not be disappointed.

In many cases they purchased sheep from dealers not suitable to their new environment, probably consisting of various types, and many may be weak in constitution. It is therefore necessary to remedy this by the infusing of fresh blood.

If such is the case purchase your sheep from where climatic influences, with pasture and soil are most like your own, and select rams and ewes, taking care that the type is similar in every respect. Many farmers do not pay sufficient attention to their flocks. There is no animal more easily improved in character than the sheep, but if neglected the reverse is the case.

On the one hand success rapidly rewards the careful breeder, on the other, failure. Why? Because mistakes have been made and the farmer has failed to alter his method of management regarding breeding. Many sheep owners have made rapid strides in breeding, have increased the weight of the fleece, and the size and type of the sheep have been improved. The result of breeding depends principally upon the accuracy of choosing the animals to be made use of for the purpose of better flocks. Wrong principles inevitably lead to failure. Every sheep farmer may not have the knowledge regarding the correct mating of the flock.

There is a maxim that should continually be borne in mind when breeding stock, and especially sheep, and that is, "Like begets like." Therefore in mating it should always appeal to the breeder, and when selecting rams to mate with the ewes similarity should be your first consideration.

Let uniformity be your watchword. Do not purchase rams this year from one breeder and next year from another who has sheep varying from its predecessor in some essential quality. It is impossible to breed uniform sheep under such conditions; therefore, have a distinct object in view, and the mixed one sees on many farms will then disappear. To mate extremes the mixed flocks one sees on many farms will then disappear. To mate extremes in any way is not correct, and if a medium between two extremes is desirable it can be only done with safety by working up from one extreme and down to the other gradually. The improvement of a flock requires much patience and perseverance and a fixed idea in mind as to what a breeder should aim at. He should notice the bad as well as the good points in the flock.

Know your flock intimately, and if you know this you can accurately describe the kind of rams required in the flock for correct mating. The healthier you keep your flock the stronger will be the offspring. Sheep farming is a business and must be conducted as such; inactivity displayed must redound on any sheep breeder who is not out for the improvement of the flocks in Western Australia. The sheep breeders who make two fibres of wool grow where before only one grew are public benefactors.

Such men are to be admired and are helpful to the State.

"HUMUS."

J. T. ARMSTRONG, B.Sc. Ag.

The humus in the soil is the technical name applied to the decomposing vegetable or organic matter in the soil: that is to say, the decomposing remains of former plant and animal life which have become incorporated in the soil.

The subject of the humus content of the soil is one which has been studied since the earliest times, and a great deal of controversy has occurred over it, and it was not until comparatively recently that the true function of the humus supply of the soil has been understood. The earlier agricultural scientists realised the value of humus, but many of their theories were erroneous. The Romans had found that a rotation of crops gave increased yields, and that after a dressing of farmyard manure the crops increased, but they did not understand the reason.

During the following centuries scientists sought to find what exactly was the food for plants, and in 1699 John Woodward published a paper setting out his views. He thought that the elements required by plants entered through the roots, only a little remained in the plant, and the excess passed out through the pores of the plant and was lost in the atmosphere until washed down by rain. He attributed the well-known falling off in crop yields, when plants were grown for successive years on the same land, to the circumstance that "the vegetable matter it first abounded in being extracted from it by successive crops, is most of it borne off. . . . .

The land may be brought to produce another crop of th esame vegetables, but not until it is supplied with a new fund of matter of like sort with that it first contained; which supply is made in several ways, either by the ground being fallowed for some time until the rain has poured down a fresh stock on it, or by the tiller's care in manuring it. The best manures are parts either of vegetables or of animals which ultimately are derived from vegetables."

The fallacy in his theory is that the vegetable matter is not absorbed in solid form through the roots and the excess is lost through the pores of the plant, but his practice was correct. Boerhaave also taught that plants absorb the juices of the earth, then elaborate them into plant food.

He states that "the prime radical juice of vegetables is a compound from all the three kingdoms, viz., fossil bodies and putrefied remains of animals and vegetables. This we look on as the 'chyle' of the plant, being chiefly found in the first vessels, viz., in the roots and body of the plant, which answer to the stomach and intestines of an animal."

Wallerus in 1761, after analysing plants to discover the materials on which they live, concludes that humus is the source of their food, the "nutritiva," while the other soil constituents are merely "instrumentalia," making the proper food mixture, dissolving and attenuating it, till it can enter into the plant root. Thus chalk, and probably salts, help in dissolving the

"fatness" of the humus. Clay helps to retain the "fatness" and prevent it being washed away by rain; sand keeps the soil open and pervious to the air.

The Earl of Dundonald in 1795 also held humus to be the chief source of plant food, but that the soil needed supplies of alkaline and saline solutions to dissolve the humus and make it fit for the plant to absorb. It was thought that the plant obtained its carbon from the carbon of the soil, and that this supply must have come from the remains of plants and animals.

This view was proved false by de Saussure, who found the soil furnished only a very small part of the food required by plants, but that this part was indispensable in that it contained nitrogen.

Later it was proved the nitrogen was derived mainly from the humus in the soil.

Liebeg in 1840 argued that although plants have an inexhaustible supply of carbonic acid in the air, time is saved in the early stages of growth if carbonic acid is being generated in the soil, for it enters the plant root and affords extra nutriment to that which the leaves absorb; hence a supply of humus which continuously yields carbonic acid is advantageous.

Further carbonic acid dissolves the more insoluble minerals in the soil, and that increases the supply of mineral plant food. The true function of humus, in his opinion, is to evolve carbon dioxide.

Before he died scientists had definitely settled that potassium, magnesium, calcium, iron, phosphorus, sulphur, carbon, nitrogen, hydrogen, and oxygen were all necessary to plant life, and yet the true function of humus had not been definitely understood, though all admitted the necessity of a supply of organic matter.

Since his death much work has been done and a great advance made in the understanding of agricultural chemistry, and it has been found that the functions of humus are far more complex and far-reaching than was at first thought.

The earlier scientists knew nitrogen to be essential for plant growth, and bacteriologists have now proved that the humus in the soil supplies a fund from which plants obtain the nitrogen they need. The nitrates required are elaborated from humus by certain species of soil bacteria. If this were the only function of humus it would not be necessary in a soil because nitrogenous manures may be applied, but at added expense. Again, the carbohydrates in the humus afford food for other bacteria which, in their turn, break down the more insoluble minerals in the soil and make them available for plants. Carbon dioxide is also evolved, and with water forms a weak acid—carbonic acid, which also assists in the breaking down of insoluble mineral matter.

Good physical condition of the soil is just as important for successful cropping as is a supply of plant food, and here again humus plays a very important part, quite as important as any farm implement, if not more so, because on a soil dificient in humus far greater expense is incurred in getting the land ready for cropping. Land deficient in humus is, if clayey, cold, wet,

and sticky in the winter, very hard to work up into a good seed bed; if sandy—open, fluffy, and hungry.

In the summer, clay soils deficient in this valuable constituent are hard, dry and hot. Sandy soils get hot, dry, and tend to blow. Humus—

(i.) makes soils darker in colour;

(ii.) makes clay soils less sticky.

(iii.) binds sandy soils;

(iv.) increases the water-holding capacity;

(v.) it increases the absorptive power of the soil, through its colloidal form, for important substances as ammonia, potash, and phosphoric acid.

(vi.) furnishes combined nitrogen.

A soil with a high humus content is warm, mellow, and easy to work in the wet weather, and easy to keep in good tilth in the summer.

In dry districts, such as the biggest part of this State, the organic content of the soil is low, although the nitrogen content is high, due to the fact that nitrates prepared by soil bacteria are not leached out as is the case in wetter condtions. For this reason the practice of burning stubble is particularly harmful, because the fund of organic matter, originally low, is soon dissipated and the land becomes, as the farmer puts it, run down.

For summer cropping a high humus content is even more necessary. A firm fine seed bed and a fine tilth is necessary to obtain a good germination, and a good supply of moisture is necessary to ensure successful growth. These results can only be obtained in a soil with a high organic content.

All summer fodders grown in this State are sown to be used for green feed for stock, and leafy succulent foliage of good colour is necessary, and to obtain plants with these characteristics a plentiful supply of nitrogen is necessary, and the cheapest method to obtain nitrates is from humus. Also leguminous crops can be sown and fed off, the bacteria working symbiotically with legumes, add nitrates to the soil, and the vegetable matter when decomposed adds a further supply of nitrogen.

Even very poor sandy soils can be made profitable by increasing the humus content.

Rye, barley or oats are sown and fed off when young, and the cattle or sheep droppings are spread and later ploughed in. The nitrate content of the soil is increased and the physical conditions are improved, and the soil becomes less "hungry." The water-holding capacity increases, the growing period is lengthened, and instead of thin, straggly, pale-coloured plants, the land produces crops of strong, healthy, succulent, green-leaved plants.

"EPHOS" PHOSPHATE AND SUPERPHOSPHATE.

THEIR RELATIVE EFFECT UPON THE WHEAT CROP AT THE MERREDIN EXPERIMENT FARM, 1925.

Geo. L. Sutton,
Director of Agriculture.

"Ephos" is a phosphate fertiliser prepared by grinding the soft Egyptian phosphatic rock to a fine state of division. It is prepared and sold without treatment, other than grinding, by a British company known as the Egyptian Phosphate Company, with its central office in London, and to whom the Department is indebted for the supply of "Ephos" used in this trial.

The use of untreated ground rock phosphates attracted attention in Great Britain and on the Continent because of the change which has taken place since about 1912 in the character of basic slag or "Thomas phosphate," and in consequence of which the quality is not as good as that produced under the old Bessemer process. Because of this, and owing to the very general and profitable use of the old basic slag in Great Britain, substitutes

"Superphosphate." "Ephos" Phosphate.

The Trial Plots as they appeared in July.

for basic slag have been sought, and quite a number of experiments have been conducted to determine whether phosphatic rock, when finely ground, could take the place of basic slag.

Dr. G. Scott Robertson, who had the advantage of being in close touch with the steel-making industry, of which basic slag is a by-product, also had opportunities for carrying out agricultural experiments with the different types of basic slag and rock phosphates. These experiments were commenced in Essex, England, in 1915, and continued for five years. The conclusions which Dr. Robertson formed from the results of these experiments regarding the value of rock phosphates for manuring pastures were: "They have a much higher manurial value than has hitherto been admitted. On sour soils and where the rainfall is high there is a certain amount of evidence which suggests that they may even prove superior to the best grades of basic slag. Even under conditions which favour high solubility (low rainfall and a sweet soil), as at Horndon, their value as a source of phosphate for the manuring of grass land is very close to that of high soluble basic slag. In every experiment they have proved more effective than the open hearth fluorspar slags. Of the various types of rock phosphate Gafsa seems to be the most suitable for direct application. There is evidence that on sweet soil, or where the rainfall is low, the more soluble types of North African phosphates, *e.g.*, Gafsa, Egyptian, Algerian, and Tunisian are superior to the richer, less soluble and harder types such as Florida Pebble."

The rainfall recorded at Horndon referred to above from 1st May (spring) to harvest in 1918 was 225 points (date of cutting 8th July); in 1920 was 534 points (date of cutting 16th August). In 1919 the plots were grazed by cattle and sheep; the rainfall in that year to 1st July, when the grazing commenced, was 178 points.

Because of the satisfactory results obtained, particularly at Horndon already referred to above, where the rainfall was comparatively light, and where the effect of superphosphate was also compared with that of the slags and phosphatic rocks, the vendors of "Ephos" believed that even under Australian conditions it would prove superior to superphosphate for wheat growing. They accordingly undertook to furnish a quantity of "Ephos" phosphate for trial purposes. This was received in February, 1925, through their agents, Messrs. Bowden Brothers & Company, of Sydney, and forwarded to the Merredin Experiment Farm for trial in comparison with superphosphate. The "Ephos" phosphate was admirably suited for the comparison, for it represents the softer and more soluble type of phosphatic rock as distinct from the harder one of which the Nauru rock, from which the local superphosphate is made, is typical.

The Egyptian phosphate, whilst not as rich as that from Nauru, which contains from 82 to 88 per cent. phosphate, is of good quality, and contains from 56 to 60 per cent. phosphate, equivalent to 25.7 per cent. to 27.5 phosphoric acid.

The soil on which the experiment was conducted was a clay loam typical of the Gimlet and Salmon Gum forest land and known to be deficient in phosphoric acid, and therefore responsive to phosphatic fertilisers. The details of a chemical analysis of a representative soil of this type, and taken

from a location near the site of the present experiment, carried out by Dr. Simpson, the Government Analyst, are shown hereunder:—

	A.—Soil. per cent.	B.—Subsoil. per cent.
In Original Sample		
Roots	*Nil*	*Nil*
Stones	*Nil*	4
Fine soil	100	96
Reaction (pH) of 10 per cent. suspension	7·9 Faintly alkaline.	7·8 Faintly alkaline.
On Steam-dried Sample		
Loss on ignition	7·27	7·29
Residue after ignition	92·73	92·71
Organic carbon	0·775	0·559
Nitrogen	0·045	0·073
Lime as carbonate	0·153	0·879
Lime as sulphate, etc.	0·055	0·049
Hydrochloric acid soluble potash	0·392	0·470
Hydrochloric acid soluble phos. oxide	0·024	0·021
*Available potash	0·017	0·014
Available phosphoric oxide	trace	trace
Total water soluble salts (after gentle ignition)	0·296	0·470
Sodium chloride calculated from chlorine	0·148	0·221
Mechanical Analysis on Steam-dried Sample –		
Sand grade	24·8	21·0
Silt grade	32·9	33·9
Clay grade	42·3	45·1
Soil apparent specific gravity	1·26	1·28
Colour (wet)	Brown	Light brown
Description	Clay loam	Clay loam

* Soluble in 1 per cent citric acid.

The experiments conducted in Essex, England, were on pasture land, and the amounts of fertiliser applied were, from an Australian point of

"Ephos" Phosphate. 129lbs. per acre. | Superphosphate. 150lbs. per acre. | "Ephos" Phosphate. 258lbs. per acre.

The Trial Plots at Harvest Time.

view, extremely heavy and sufficient to supply 200 lbs. of phosphoric acid per acre. To supply this amount about 900 lbs. of high grade (22 per cent.) superphosphate is necessary, or from 700 to 800 lbs. of rock phosphate. Under the conditions which obtain at Merredin an application of 150lbs. of superphosphate per acre is regarded as a liberal dressing. For the purpose of this experiment it was decided to use a plot receiving this amount as the "control" plot, and to compare the results obtained with those from plots to which "Ephos" phosphate was applied at such rates as would supply the same amount and twice the amount respectively as supplied by the 150lb. superphosphate. The superphosphate used in the trial was that locally manufactured, and which has a total phosphoric acid content of 22 per cent., of which 20.5 per cent. is water soluble and .5 per cent. citrate soluble. The total quantity of phosphoric acid supplied by 150lbs. of this fertiliser would therefore be 33lbs. per acre. The amounts of "Ephos" phosphate applied to meet the requirements of the experiment as stated were 129 and 258 lbs. respectively.

The experiment consisted of a series of three plots fertilised according to the following scheme:—

Plot 1—"Ephos" phosphate, 129lbs. per acre.

Plot 2—Superphosphate, 150lbs. per acre.

Plot 3—"Ephos" phosphate, 258lbs. per acre.

This series was repeated eight times.

Each plot was one drill width wide and 10 chains long, but just prior to harvest this length was reduced so as to make the area for comparison one-eighth acre. The ground was ploughed in June, 1924, about four inches deep, then cultivated in September of the same year, again in March of the following year, and disced in April prior to being seeded. The plots were sown on 15th April with "Nabawa" at the rate of 45lbs. per acre. The germination, which was delayed until the May rains, was good, and was completed by the end of May.

The rainfall in points (100 points = 1 inch) recorded during the past year at the Merredin Experiment Farm was:—

—	Jan.	Feb.	Mar.	Apl.	Growing Period.						Total May to Oct.	Nov.	Dec.	Total.
					May.	June.	July.	Aug.	Sept.	Oct.				
...	235	136	43	27	104	147	134	18	98	53	554	5	26	1,026

The manager, Mr. J. H. Langfield, in recording his observations made during the progress of the experiment, states:—

> "It was noticed quite early that the growth on the plots fertilised with "Ephos" phosphate was poor, and not nearly as vigorous as those to which superphosphate had been applied. The stooling was also poor, and presented the appearance usually observed on unmanured plots. Finally the crop on these plots matured about ten days later than the controls."

The results obtained are hereunder:—

MERREDIN EXPERIMENT FARM.
"Ephos" Phosphate and Superphosphate.
Variety "Nabawa"—Planted 15th April, 1925.
(Seed per acre, 45lbs.)
HAY YIELDS.

Fertilizer.	Phosphoric acid per acre.	Computed Yield per Acre.												Percentage Yield.
		Section 1.			Section 2.			Section 3.			Average.			
	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	cwt.	qrs.	lbs.	
"Ephos"	33	6	2	24	8	0	24	4	0	8	6	1	8	32
Superphosphate ...	33	16	0	8	21	2	16	21	2	16	19	3	4	100
"Ephos"	66	7	1	12	7	0	8	7	1	4	7	0	26	37

GRAIN YIELDS.

Fertilizer.	Rate per acre.	Computed Yields per Acre.														Per-centage Yield.
		Section 1		Section 2.		Section 3		Section 4.		Section 5.		Average.				
	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.	bus.	lbs.			
"Ephos"	129	8	56	10	40	8	40	8	40	8	16	9	2			46
Superphosphate ...	150	20	16	22	40	20	48	18	0	16	8	19	34			100
"Ephos"	258	10	40	8	48	8	40	8	40	8	8	9	0			46

The results are so consistently and definitely in favour of superphosphate, both for hay and grain, that they provide no warrant to advocate any departure from the general practice of using superphosphate with the wheat crop in the wheat belt of this State.

Superphosphate. "Ephos" Phosphate.
The Trial Plots at Harvest Time.

Gastrolobium densifolium.

A NEW POISON PLANT.

(*Gastrolobium densifolium*, Gardner.)

C. A. Gardner.

A new species of Gastrolobium has been added to the already large list of Western Australian poison plants. It occurs in the districts to the East of the Great Southern Railway, being recorded from between Kukerin and Lake Grace, and near Dudinin, both records being made during the spring of last year.

The specimens from Dudinin were received from Messrs. Gottsch Brothers, who had suspected it for a number of years as a poison plant. During the last flowering season they lost 30 sheep out of 500 in two days, and fully half of the remainder showed symptoms of poisoning. *Post-mortem* examinations revealed the leaves of the plant in the poisoned sheep, the lining of the stomach being affected.

In feeding experiments carried out on guinea pigs by Mr. H. W. Bennetts, the Government Veterinary Pathologist, the plant was found to be toxic, dried material being used, and the fatal dose was about seven grams of leaves. The symptoms shown were rough coat, loss of appetite, shivering and erratic movements, and a *post-mortem* examination revealed congestion of the liver, kidneys, lungs, and other organs.

The new plant has leaves similar in shape to those of York Road poison, but more acutely pungent, also they are of a deep green, not bluish, and thicker than those of any other species. They are crowded along the stems, and spreading. The yellow flowers, suffused with purple, are similar to those of the other poison plants of the South-West. The plant, as at present known, inhabits gravelly rises in poor soil in Wandoo (White Gum) and scrub country, and the flowering period is September to October.

This plant will shortly be described elsewhere.

VITICULTURAL NOTES.

H. K. JOHNS,
Viticulturist.

April.

During this month vintage will be completed in all districts.

Special attention should be applied to a thorough cleaning of all utensils and plant which have been used during vintage, and all wood appliances should be thoroughly dried before storing away; same to be stored in dry place where they will be free from attacks of mould, etc. Dry wines should receive attention at short periods; as soon as fermentation has completed casks and vats should be sealed.

A useful method for ascertaining if fermentation has ceased is that of burning a lighted match, holding same as far as possible down in the bung hole of the cask or vat; if the match burns brightly the fermentation has ceased, and vessel can be sealed; if the lighted match immediately goes out, cover up bung hole, allowing small vent for escaping gases. Dry wines that have cleared should be racked over sulphur fumes and filled right up. Sweet wines should receive attention towards the end of this month; ascertain if they are fortified up to required strength, and if not, rack and re-fortify till the required strength is reached.

This is essential, as it insures the wine against any secondary ferments that are liable to attack it at the change of season. Remove such odds and ends from the cellar as are liable to favour multiplication of the vinegar-fly —fermentable refuse skim, lees, skimming, etc.

Drains in and around the cellar should be cleaned daily, and kept well limed.

May.

Vineyard manuring is now pretty generally followed, both with drying grapes and wine varieties, where it is of value to obtain large berries, also production of quality and character.

The vine is a heavy feeder, and repays any attention it receives in this direction. Potash, ammonia, bonedust, superphosphates, and green manuring are general methods adopted. Green cover crops of peas sown early and ploughed in during the spring is one of the general practices which is fast becoming universal.

This general manuring has a splendid effect upon the foliage of the vines, imparting a rich dark green colour and healthy appearance.

When it is intended to lay out land for young plantations, the work of preparation should be pushed forward with all possible speed whilst weather conditions are suitable.

Selected land should be cleared to a depth of about 22 inches, and where stiff clay subsoils abound trenching to a depth of 18 to 20 inches should be carried out.

Subsoiling before planting is a sound practice, with the possible exception in the case of very light soil and subsoil.

Vines should be encouraged to a penetration of a rooting system well below the depth of a deep ploughing, not only from a view point of root injury from the plough, but also a resistance against dry seasons and shortage of soil moisture through insufficient depth of cultivation during winter and spring periods. At this present juncture of the season one has only to visit the Swan Valley area, where several object lessons of too shallow a planting and surface rooted vineyards have stressed very badly during the season are in evidence.

The resultant fruit from these vineyards this year are small berries, inclined to be slightly acid and low in density, and generally give unprofitable returns; also, vines that suffer from this set back will not in the following season produce good fruit, therefore I strongly advise any intending planter to prepare their land thoroughly and plant vines to a depth of approximately 12 inches.

Feeding off of foliage of the vine with horses and cattle has again come under my notice. No doubt the green foliage makes succulent feed in a season similar to what we have just passed through, but it is a practice I could not deprecate too strongly by reason of the damaging effect of the rupture of the terminals, breaking of good fruiting cams required for next season's fruit-bearing and consequent shock to the vine itself. When the foliage of the vine have commenced to show their autumn tints, indicating that their period of service for the season has ended and the dormant period arrived, then, and not until then, should stock be admitted, if admitted at all, and only sheep is preferred.

They can remain in during most of the pruning period.

They keep down the growth of grass and weeds, and the manure which they leave is of some service in enriching the land.

Cellar.—Continue attention to all young wines, racking and keeping all dry wines filled.

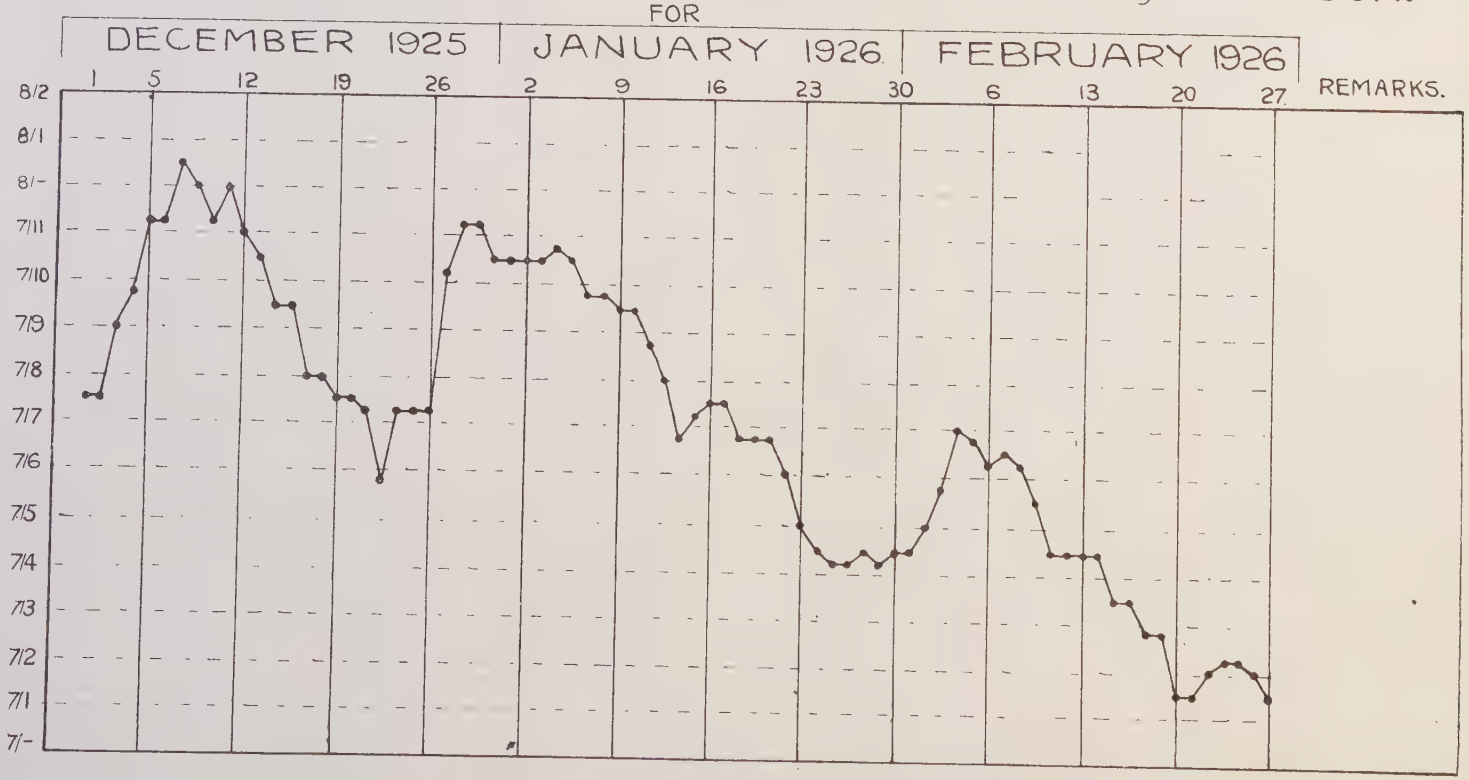
June.

Vines will have reached the stage in this month when pruning will be at hand. Generally it is not advisable to commence until after the leaves fall or the first severe frosts, and where large areas have to be gone through it is wise to push this work through with all possible despatch, for the reason that the longer it is left from now on the colder and more miserable the weather is likely to be.

Every grower knows pruning is by no means warm work, and if it be raining or with heavy frosts around or a keen wind blowing, there are many more preferable jobs than pruning. Continue preparation of land for young plantations.

Cellar.—Keep all dry wine well filled. First racking of young wines to be completed. Rack older wines for this work; choose fine weather.

RETURN OF WHEAT PRICES PER BUSHEL C.I.F. & E. LONDON.



COMPILED FROM FIGURES KINDLY SUPPLIED BY THE COOPERATIVE WHEAT POOL OF W.A.

LIVE STOCK AND MEAT.

For the information of readers of the "Journal," the following particulars have been supplied by Messrs. Elder, Smith, & Co., Limited, Perth:—

COMPARATIVE YARDINGS OF STOCK AT METROPOLITAN FAT STOCK MARKETS, DURING MONTHS OF DECEMBER, 1925, JANUARY AND FEBRUARY, 1926.

	DECEMBER, 1925				JANUARY, 1926.				FEBRUARY, 1926.			
	2.	9.	16.	22.	6.	13.	20.	27.	3.	10.	17.	24.
Sheep ...	15,687	13,689	14,586	12,282	15,815	12,059	12,240	10,440	10,544	12,946	11,910	9,556
Cattle	875	409	669	926	868	845	642	564	536	625	678	691
Pigs	428	417	983	758	1,034	812	804	1,238	1,108	893	779	847

COMPARATIVE VALUES OF STOCK SOLD AT METROPOLITAN FAT STOCK MARKETS, DURING MONTHS OF DECEMBER, 1925, JANUARY AND FEBRUARY, 1926.

	DECEMBER, 1925.				JANUARY, 1926.				FEBRUARY, 1926.			
	2.	9.	16.	22.	6.	13.	20.	27.	3.	10.	17.	24.
	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.	d.
Mutton ...	6¼	6½	7½	7½	7	6½	6¾	7½	8	7	7	7
Beef	5	6¼	6¼	6¼	6½	6	5½	6	6½	6½	6¼	5¾
Pork	8¾	10	12	12	11¾	11¾	11¾	11¾	11	10¾	11	10½
Bacon	8½	9	9½	9½	10¾	10¾	10¾	10¾	10	9½	10	10¼

MARKET REPORT.

The following particulars of the approximate quantity of chaff available for auction at the metropolitan chaff and grain auction sales, held in Perth during the months of December, January, and February, also the minimum and maximum prices ruling for f.a.q. to prime quality, have been supplied by Messrs. H. J. Wigmore & Co., Limited, of Wellington Street, Perth:—

Wheaten Chaff—

December: Quantity—1,500 tons.
Maximum price—£6 5s. per ton.
Minimum price—£5 5s. per ton.

January: Quantity—1,500 tons.
Maximum price—£7 per ton.
Minimum price—£6 10s. per ton.

February: Quantity—2,100 tons.
Maximum price—£7 per ton.
Minimum price—£6 10s. per ton.

At the beginning of December the market was almost glutted, and f.a.q. to prime wheaten was selling at £5 5s. per ton. This was accounted for chiefly by cutters being in full swing cutting from the stooks, and with a poor outside demand a good quantity of the chaff was finding its way to market. However, during January and February the demand improved, and supplies arriving were only just sufficient to meet trade requirements. During those months the market fluctuated between £6 10s. and £7—£6 15s. could be called a fair average price. At time of writing, 8th March, 1926, yardings are dwindling and the market rising, f.a.q. to prime wheaten being worth £7 5s. per ton. There is good demand setting in from the country for chaff for seeding purposes, and we anticipate a very firm market.

Oaten Chaff.—During February the market was almost glutted, f.a.q. falling as low as £5 5s. per ton. However, supplies now arriving are light, and f.a.q. is worth £5 15s. per ton with an occasional truck up to £6.

Oats.—A fair quantity of really good heavy Algerian oats have been shipped to Melbourne during the last few months, and the market for this quality has been steady, at around 3s. per bushel. Ordinary feed samples and inferrior have been very dull of sale, good feeds realising from 2s. 6d. to 2s. 8d. and mediums and inferior from 2s. to 2s. 3d. No business is possible with Victoria at the moment. There is good demand for clean, heavy oats of all varieties suitable for seed purposes, and very satisfactory prices can be secured for consignments coming to auction.

Wheat.—The market at the moment is rather dull, f.a.q. being worth 6s. per bushel under the hammer. Smutty and inferior are in request at lower rates, according to quality.

Barley.—The demand is rather better, and good clean Cape is worth 3s. 6d. to 3s. 7d. per bushel.

METEOROLOGICAL INFORMATION.

1925–6.

STATIONS.	TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.		TEMPERATURE.				RAINFALL.	
	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.	Maximum.		Minimum.		For Month.	Average.
	Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.			Mean.	Highest.	Mean.	Lowest.		
	DECEMBER, 1925						JANUARY, 1926.						FEBRUARY, 1926.					
					inches.	inches.					inches.	inches.					inches.	inches.
Chapman Farm State	85·4	104·5	60·7	49·8	84	18	95·9	110·5	66·3	58·3	1	30	88·1	104·7	60·7	50·1	29	55
Geraldton	80·8	99·2	65·9	56·6	49	13	87·2	112·0	68·6	59·5	3	23	80·4	93·0	64·2	54·0	*Nil*	32
Walebing	88·3	108·0	...	...	85	47	97·6	108·5	61·4	53·5	32	35	88·3	105·2	57·9	49·4	85	46
Perth	80·4	98·4	62·4	53·0	65	...	88·9	105·7	65·8	56·0	3	34	79·7	100·7	61·2	54·0	61	45
Kalamunda	78·9	99·0	61·6	53·0	58	88	91·7	106·2	64·1	55·3	6	54	80·7	100·0	58·8	50·0	105	72
Bunbury	80·0	93·8	60·1	47·2	106	60	87·8	103·2	60·7	52·2	*Nil*	45	77·2	93·2	57·9	47·4	92	57
Bridgetown	81·8	102·0	54·3	38·0	134	79	90·9	104·0	53·9	43·5	*Nil*	55	80·9	101·2	51·5	40·0	113	66
Albany	73·2	88·2	59·2	54·2	376	111	71·6	79·0	61·4	55·8	17	74	73·9	93·4	57·6	49·0	222	94
Merredin State Farm	89·3	106·8	60·7	48·4	26	67	95·8	107·2	64·6	54·8	*Nil*	67	89·6	105·9	60·7	48·9	26	63
Northam	88·0	105·5	60·7	49·0	15	36	97·5	111·5	65·4	58·1	6	29	89·6	105·2	61·8	52·5	42	41
York	88·2	105·0	60·3	48·0	12	44	97·0	110·0	63·9	56·4	*Nil*	33	88·8	106·8	60·7	50·0	46	47
Narrogin State Farm	84·5	102·8	55·7	46·8	203	57	91·3	105·5	57·5	50·0	8	35	84·8	102·8	55·1	45·6	69	62
Katanning	82·1	102·1	57·0	49·7	266	54	88·8	102·8	57·2	49·0	15	37	83·2	103·0	56·1	47·0	41	59
Cape Leeuwin ...	73·6	83·5	61·6	56·5	63	90	76·1	91·0	63·6	56·8	10	66	73·9	79·8	62·0	55·0	162	87

WESTERN AUSTRALIA—DEPARTMENT OF AGRICULTURE.

List of Bulletins available for Distribution.

No. 5.—*Fruit Drying.* By J. F. Moody. Free.
No. 15.—*Root Rot.* By A. J. Despeissis. Free.
No. 20.—*The Pruning of Fruit Trees.* By J. F. Moody. Price 2s. 6d.
No. 30.—*Codlin Moth.* L. J. Newman. (Reprint from "Journal.")
No. 46.—*Fruit Packing and Marketing and Exporting of Fruit.* By J. F. Moody and J. Ramage. Price 1s. 6d.
No. 47.—*The Poultry Keeper's Manual.* By G. Allman. Price 1s.
No. 83.—*Horticulture and Viticulture.* By A. Despeissis. Price 2s.
No. 49.—*The Feeding of Horses.* By Professor Paterson and G. L. Sutton. Free.
No. 57.—*Vermin Destruction.* By A. Crawford. Free.
No. 60.—*The Farmer's Clip.* By J. J. Mahood. Free.
No. 68.—*Flaying and Treatment of Hides.* By R. E. Weir. Free.
No. 72.—*The Potato: Its Cultivation, Pests, and Diseases.* By G. N. Lowe, L. J. Newman D. A. Herbert. Free.
No. 74.—*Tobacco Growing: Notes for Intending Planters.* By G. W. Wickens. Free.
No. 79.—*Sheep on the Wheat Farm and their Management in W.A.* By H. McCallum. Free
No. 87.—*Sheep Feeding Experiments: State Farm, Chapman,* 1920. By G. L. Sutton and F. Vanzetti. Free.
No. 88.—*Light Land: Conference.* By G. L. Sutton. Free.
No. 90.—*Stock Waters: Standard for Composition of.* By E. A. Mann. Free.
No. 93.—*The Home Tanning of Sheep and other Skins.* By H. Salt. Free.
No. 94.—*The Dingo.* By B. W. Leake. Free.
No. 96.—*Poison Plants of W.A.* By D. A. Herbert. Free.
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No. 103.—*Kerosene Method for Eradicating the Zamia Palm.* By G. K. Baron-Hay. Free.
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No. 105.—*Pedigree Selection of Seed.* By G. L. Sutton. Free.
No. 106.—*The Red Legged Velvet Earth Mite.* By L. J. Newman. Free.
No. 107.—*Sudan Grass.* By G. L. Sutton. Free.
No. 109.—*Rape* By G. L. Sutton. Free.
No. 111.—*Standard Wheat Varieties.* By G. L. Sutton and F. Vanzetti. Free.
No. 112.—*Automatic Device for Eradication of Stickfast Flea.* By G. Allman. Free.
No. 113.—*Picked Pieces (Classification of Clip).* Free.
No. 114.—*Blue Mould on Citrus Fruits.* By W. M. Carne. Free.
No. 115.—*The Value of Windmills for Pumping Water in W.A.* A. H. Scott.
No. 116.—*Spotted Wilt of Tomatoes.* W. M. Carne.
No. 117.—*Cream.* P. G. Hampshire.
No. 118.—*Pigs and Pig Raising.* P. G. Hampshire.
No. 119.—*Take-all of Wheat and Similar Diseases of Cereals.* By W. M. Carne and J. G. C. Campbell.
No. 120.—*Pastures in the South-West.* A. B. Adams. (Reprint from "Journal.")
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This publication contains valuable information dealing with all commercial fruits grown in Western Australia, including advice on planting, pruning, packing, manuring, fruit-drying, wine-making, insect and fungoid pests and their treatment, etc., and the whole forms a text book which every fruitgrower, whether large or small, should have in his possession. The price originally was 8s. 6d., but to allow of distribution being as wide as possible it has been reduced to 2s.

The Pruning of Fruit Trees, by J. F. Moody, Fruit Industries Commissioner:

This publication contains numerous illustrations, being reproduction of photographs taken in this State, of pruned and unpruned trees, which make the details set out in the letterpress particularly easy to understand. Price 2s. 6d.

Fruit Packing and the Marketing and Exporting of Fruit, by J. F. Moody, Fruit Industries Commissioner, and J. Ramage, Packing Instructor:

This publication contains invaluable information on packing and grading fruit for local and export markets. It is freely illustrated, and no fruit-packing shed should be without a copy. Price 1s. 6d.

The Poultry Keepers' Manual, by George Allman, Government Poultry Expert:

This is a most useful and valuable book, not only for beginners, but to all those who keep fowls for pleasure and profit. It deals fully with all matters connected with the industry, including Breeding, Feeding (for stock birds or egg production), Incubating, Brooding and care of chicks, Marketing (eggs and poultry), and all matters of use to the poultry-keeper. It also fully describes symptons of various ailments and diseases and simple treatment for same, and, as the book was written to suit *local conditions*, every poultry-keeper should have a copy by him. Price, 1s

Agricultural Bank.

ADVANCES TO FARMERS:

The Agricultural Bank, which is a State institution and is worked under a Special Act, was founded with the object of making advances to settlers for the purpose of assisting and encouraging them during the early years of the development of their farm.

The Agricultural Bank makes advances on approved securities to approved persons engaged in the business of farming or grazing, or in horticultural pursuits, to an amount not exceeding £2,000.

Every application must be made on the prescribed form, and must contain full particulars of the purposes for which the advance is required.

Where an advance is approved for effecting improvements on the borrower's land, such advance is made by progress payments as the work progresses.

Developmental advances are usually made for clearing, fencing, ringbarking, and water supply, and are made to the full value of the work done after it has been inspected and certified to by a responsible officer. After a reasonable stage of development has been reached, and providing the general progress of the settler is considered satisfactory, limited assistance is granted towards building (maximum £250), and money is provided to assist in the purchase of stock and machinery, the maximum amount for this purpose, except in special cases, being £150.

Interest is charged at the rate of seven per cent. per annum, and repayment of principal extends over a period of 30 years, except in the case of stock or machinery advances which have a currency of eight years only.

The security required by the Bank is a first mortgage over the lands on which the advance is to be expended, and such lands may consist of :—

(a) Holdings in fee simple ; or
(b) Holdings under Special Occupation Lease or Conditional Purchase from the Crown ; or
(c) Homestead Farms ; or
(d) Such other real or leasehold property as the Trustees may think fit.

Mortgages are prepared free of charge ; but borrowers are required to pay the statutory costs of registration.

Interest only on the advances made is charged during the first 10 years, and repayment of the capital does not commence until the eleventh year.

Application may be for sums of £25, or any multiple thereof, not exceeding £2,000. Each application must be accompanied by a valuation fee of one per cent of the amount applied for. No refund of fee is allowed after an inspection of the security has been made.

The leases, or Occupation Certificate, as the case may be, together with the fees, must be in the possession of the Bank before a mortgage can be prepared.

REGISTRATION FEES.

	s.	d.
For each Conditional Purchase, Homestead Farm, or Grazing Lease under the Land Act	5	0
For each Freehold Lot or Crown Lease	10	0
For every additional Freehold Lot or Crown Lease	2	0

STAMP DUTY

	s.	d.		s.	d.
Up to £50	1	3	From £301 to £400	10	0
From £51 to £100	2	6	„ £400 „ £500	12	6
„ £101 „ £150	3	9	Stock Bill of Sale, up to £50	5	0
„ £151 „ £200	5	0	„ „ over £50	10	0
„ £201 „ £250	6	3	Machinery Bill of Sale, up to £50	5	0
„ £251 „ £300	7	6	„ „ „ over £50	10	0

Intending borrowers are requested to note that no advances are made against improvements effected prior to date of application. Applications should, in every instance, be lodged prior to commencement of work, and moneys are then paid over in progress payments as the work proceeds.

IMPROVED FARMS.

The Trustees of the Agricultural Bank have, from time to time, improved farms on their hands which have been abandoned for various causes, or have been taken over as security for loans. These farms are available for purchase, and extended terms are given for payment of the amount. They often offer to intending settlers an opportunity of obtaining an improved holding, ready for occupation, at a cheap rate, without having to undertake the preliminary work of clearing and fencing. The properties, when obtainable, are advertised in the "Government Gazette" ; but anyone wishing for particulars of such farms as may be available should make application to the Managing Trustee of the Agricultural Bank. Particulars will then be sent, and an inspection can be made by the intending settler to ascertain whether the same is suitable for his requirements.